Conceptual Revised Closure Plan (30%) for Lowry Vista Redevelopment

1.0 Introduction

This Conceptual Revised Closure Plan (the Revised Plan) is submitted by IRG Redevelopment I, LLC (IRGI), current owner of the property known as Lowry Vista located at the former Lowry Air Force Base (Lowry). Lowry Vista consists of a total of approximately 80 acres in the southern portion of Lowry. Approximately 70 acres of this property are associated with the former Operable Unit 2 Landfill Zone (the OU2 Landfill Zone or Site) (See Figure 1). In 2006, the Lowry Economic Redevelopment Authority (LRA) conveyed approximately 80 acres of property to IRGI, which includes the acreage associated with Operable Unit 2 (OU2), the former landfill at Lowry. Since that time, IRGI has partnered with Industrial Realty Group, LLC and Bear Creek Capital to form Lowry Vista, LLC in order to pursue potential redevelopment opportunities associated with this property.

OU2 was transferred by deed from the Air Force to LRA via a Finding of Suitability of Early Transfer (FOSET) in January 2006. This transfer included the environmental protection provisions to ensure protection of human health and the environment from OU2 and to preclude any interference with completed closure activities. Both the U.S. Air Force and CDPHE recorded restrictive covenants on OU2; however, each covenant does provide a process for modification of these restrictions so long as such modifications meet the federal and state statutes and regulations and are protective of human health and the environment.

This Conceptual Revised Plan presents how redevelopment of the site can be accomplished while being protective of human health and the environment and in accordance with the restrictions at the Site. IRGI will present the Revised Plan in three stages to the Colorado Department of Public Health and Environment (CDPHE or Department): a 30% complete document; a 60% complete document and a 90% complete document. The following sections presented here in this document include:

- A summary of existing conditions of the OU2 Landfill Zone;
- An overview of the General Development Plan;
- Conceptual modifications to the existing closure of the landfill cover that would result from redevelopment activities;
- Preliminary engineering/procedures for design and redevelopment activities;
- An outline of the Draft Materials Management Plan;
- An outline of a Vapor Mitigation Plan;
- An outline of the Modified Long-Term Monitoring Program; and,
- Discussion of Regulatory Plan.

The Lowry Vista project involves a number of stakeholders and requires various governmental entities approvals prior to any redevelopment of this Site. This 30% Revised Plan is presented to commence discussion with the Department on the proposed and ultimate modification of the

current closure of OU2 to allow for a mixed-use community, which meets all federal, state and local statutes and regulations and is protective of human health and the environment.

1.1 Background/History of OU2 Landfill Zone

The OU2 Landfill Zone encompasses approximately 70 acres and is located in the southern portion of Lowry in the city of Denver, Colorado, approximately 5 miles east of downtown Denver (Figure 1). The OU2 Landfill Zone is bordered by Alameda Avenue to the south, the Westerly Creek Dam wetlands to the north, Westerly Creek to the east, and multi-family units to the west of the embankment.

The landfill was historically used for disposal of base-related waste and associated construction waste and debris primarily from training activities conducted at Lowry. Since most of the disposal at OU2 occurred prior to the 1980s and the fact that this landfill was solely used by the U.S. Air Force for its activities, there is very little documented information regarding the types of wastes that were disposed of in the OU2 Landfill Zone. Based on Lowry's mission as a training base, the waste likely consists of municipal-type garbage, construction and demolition debris, and other materials.

During the performance of the Supplemental Remedial Investigation (SRI), the U.S. Air Force reviewed aerial photographs in order to determine the extent of the waste disposal areas. This review identified disposal trenches and areas of surficial disturbance within the Landfill Zone, extending from north and east of the Building 1390 complex to the current location of Westerly Creek. The SRI review included nine aerial photographs from 1952 to 1972; however, it was not inclusive of all years during the period of waste disposal.

As part of the Focused Feasibility Study (FFS) in 1998, a more thorough aerial photograph review was conducted, which increased the timeframe through 1995. The increased time frame of review allowed for full observation of historical changes related to OU2 during the period of disposal activities, and identified the locations of other potential disposal areas which may not have been previously observed. A series of aerial photographs, inclusive of all years from 1948 to 1995, with the exception of 1961, was reviewed as part of the FFS. Photographs between the Lowry opening date and 1948, the year trenching activities began, were limited and undated but were reviewed for any surface changes at the OU2 site.

Review of the aerial photographs indicated that trenching operations were conducted throughout the entire area roughly bounded by the Building 1390 complex to the west, the wetlands to the north, Westerly Creek to the east, and Alameda Avenue to the south. The sequence of filling generally progressed from west to east during the life of the landfill. Disposal in the western one-third of the landfill occurred from 1948 through 1959, in the central one-third from approximately 1957 through 1970, and in the eastern one-third from approximately 1968 through 1980. Figure 2 was developed based upon this review.

In order to gain further knowledge of the waste disposal activities associated with OU2, IRGI conducted a recent review of historical aerial photographs of the Lowry Vista site to identify trenching/disposal locations. The aerial photographs reviewed included the following years: 1941, 1944, 1948, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1972, 1981, and 1982. IRGI is continuing to review more recent aerial photos to determine whether other surface or subsurface disturbances occurred.

Based on the aerial photograph review and a previously developed trench location map from Parsons Engineering (Parsons, 1995) (Figure 3), IRGI developed a revised Site map showing the historical trench locations that could be identified from these aerial photographs (Figure 2). Based on the number and size of the trench locations, IRGI approximates that 250,000 cubic yards of waste has been buried at the Lowry Vista site. This calculation was based on estimating the average height of a trench to be 15 feet and the average width of a trench as 30 feet. The trench locations are provided on Figure 2. In addition, based on the aerial photograph review, it appears that the average timeframe a trench was open for disposal operations was 1 to 2 years.

Aerial photography indicates that the landfill operated much like a typical municipal landfill; trenches were opened, vehicles could be seen at the landfilling face (likely depositing garbage), and the trenches were filled with native soils prior to being abandoned. It is likely that segregation of wastes occurred and that some drums may have been discarded. There is a record for the disposal of a single drum that contained radio tubes and other materials that contained radiological elements and the record indicated that the materials were encased in concrete within the drum.

In order to further delineate the extent of disposal activities, the U.S. Air Force performed some limited test trenching that excavated into the waste material during the FFS. Types of refuse encountered during test pit excavation include glass, paper, metal scraps, ash, and construction debris. No visual indications of hazardous waste disposal were observed during test trench excavation; however, a small area of stained soil with a diesel fuel odor was encountered at approximately 4 feet bgs within the Building 1390 complex property, immediately north of Building 1390 (Figure 4).

In addition, visual observation of the waste materials was possible during the closure of the landfill by Lowry Assumption, LLC (LAC), the entity responsible for the current closure, as site grading did expose some waste materials. During this effort, discarded bottles, concrete, bricks, pipes, building materials such as wall board, tiles, and roofing shingles were encountered.

1.2 Historical Investigations

Environmental investigations of OU2 began in 1983 under the U.S. Air Force's Installation Restoration Program (IRP) with oversight by the Colorado Department of Public Health and Environment, and input from U.S. EPA, the cities of Denver and Aurora. All studies (listed

below) were performed using State of Colorado and the U.S. Environmental Protection Agency (USEPA) published guidelines.

- 1983 - Installation Restoration Program Phase 1 Records Search
- 1987 - IRP Phase II Confirmation/Quantification
- 1990 - Remedial Investigation (RI)
- 1995 - Supplemental RI for the Landfill Zone
- 1998 - Focused Feasibility Study (evaluated 13 alternative remedies)
- 1998 - Proposed Plan
- 2002 - Privatization of landfill remedy
- 2003 - Preliminary Closure Plan for OU2
- 2003 - Phase 2 Corrective Action Plan
- 2004-2005 - Long-Term Monitoring for Radiological Parameters
- 2004-2005 - Landfill Closure Report
- 2006 - CDPHE Approved Construction Closure
- 2008 – Five Year Review

Major investigations that were conducted at the OU2 Landfill Zone to determine the nature and extent of contamination present in soil, soil gas, surface water, and groundwater included the 1990 Remedial Investigation (AR#57-64), 1995 Supplemental Remedial Investigation (AR#289-291), and the 1998 Focused Feasibility Study (AR#400, 401.10, 401.20). The following is a brief summary of the data collected during those investigations and analyzed.

Soil

Soil samples collected during the RI were analyzed for volatile halogenated compounds, volatile aromatic hydrocarbons, extractable hydrocarbons, total petroleum hydrocarbons (TPH), pesticides, polychlorinated biphenyls (PCBs), and metals. Soil samples collected during the SRI were analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), herbicides, metals, and gross alpha and beta radionuclides. Soil samples collected during the FFS were analyzed for VOCs, PAHs, pesticides, PCBs, and metals.

VOCs, PAHs, pesticides, PCBs, and metals were detected at low concentrations throughout the Landfill Zone. No metals exceeded the US Geological Survey regional levels. However, one metal (lead) exceeded the EPA soil screening level. The samples containing lead were collected within the landfill mass where materials containing metals had been disposed. With the exception of metals, which tended to decrease in concentration with depth, no lateral or vertical contaminant distribution patterns in subsurface soil were recognized during the FFS or other sampling investigations.

Soil Gas

Soil gas samples were collected and analyzed for VOCs during the RI, and VOCs and methane during the SRI and FFS. Additionally, soil gas samples were screened for hydrogen sulfide during the FFS. VOCs were detected at low concentrations in soil gas during the RI and SRI. The most commonly detected compounds were 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethene (PCE), trichloroethene (TCE), dichlorodifluoromethane (Freon-12), and dichlorotetra-fluoroethane (Freon-114). VOCs were below detection limits in soil gas samples collected during the FFS investigation.

Methane was detected at low concentrations in samples collected in the Landfill Zone during the SRI and FFS. The maximum concentration of methane detected during the SRI was 81.2 parts per million by volume (ppmv), and the maximum concentration detected during the FFS was 1.2 percent by volume (which is equivalent to 12,000 ppmv). Results for soil gas samples screened for hydrogen sulfide as part of the FFS investigation were below instrument detection limits (1 part per million (ppm)) in all samples.

Surface Water

Surface water samples collected during the basewide surface water sampling investigation (ES, 1993), SRI, and FFS were analyzed for VOCs, PAHs, pesticides, PCBs, metals, and gross alpha and beta radionuclides. Surface water samples collected during the RI were analyzed for VOCs, TPH, pesticides, metals, gross alpha and beta radionuclides, and radium 226 and 228. VOCs were not detected above applicable or relevant and appropriate requirements (ARARs) during any of the investigations. TPH was not detected in any of the surface water samples. Nine PAHs were detected in downstream surface water samples during the FFS at concentrations that exceeded Colorado surface water standards. These PAHs and maximum concentrations detected include: benzo(a)anthracene (0.38 micrograms per liter [µg/L]); benzo(a)pyrene (0.56 µg/L); benzo(b)fluoranthene (0.52 µg/L); benzo(g,h,i)perylene (0.61 µg/L); benzo(k)fluoranthene (0.18 µg/L); chrysene (0.3 µg/L); dibenz(a,h)anthracene (0.5 µg/L); indeno(1,2,3-cd)pyrene (0.35 estimated [J] µg/L); and, phenanthrene (0.36 µg/L).

The Applicable or Relevant and Appropriate Requirements (ARAR) for phenanthrene is 0.0028 µg/L. The ARAR for the other PAHs is 0.0044 µg/L. Three PAHs, including benzo(b)fluoranthene (0.022 µg/L), chrysene (0.0022 J µg/L), and phenanthrene (0.034 µg/L), were also detected at concentrations above ARARs during the SRI. The highest concentrations of PAHs were detected in surface water samples collected upstream of OU2. Three pesticides were detected in surface water samples downstream of the landfill during the SRI at concentrations that exceeded ARARs. These include aldrin (0.009 µg/L), dieldrin (0.035 µg/L), and heptachlor (0.011 µg/L). The ARARs for these pesticides are 0.002, 0.0002, and 0.008 µg/L, respectively. Pesticides were also detected above ARARs in surface water samples collected upstream of the landfill. Pesticides were not detected in any surface water samples collected during the basewide surface water investigation, RI, or FFS. PCBs were not detected in any of the surface water samples. Two total metals were detected in downstream surface

water samples during the SRI at concentrations above ARARs: iron (3,340 µg/L) and manganese (1,140 µg/L). Six metals were detected in downstream surface water samples at concentrations above ARARs during the FFS. These include barium (1,800 µg/L); beryllium (13,000 µg/L); iron (13,000 µg/L); manganese (31,300 µg/L); nickel (120 J µg/L); and thallium (2 J µg/L). The ARARs for these metals are 1,000, 4, 300, 50, 100, and 0.5 µg/L, respectively. Concentrations of these metals were slightly higher in downstream than upstream surface water samples, indicating a potential landfill source. High sediment content in surface water samples from the wetlands may have contributed to high metals concentrations.

Gross alpha and gross beta radionuclides were detected in downstream surface water samples during the SRI and FFS at activities that exceeded ARARs. Maximum gross alpha and gross beta radionuclide activities detected were 880 J and 940 J picocuries per liter (pCi/L), respectively. The ARAR is 15 pCi/L. Gross alpha and gross beta radionuclide activities in upstream and downstream surface water samples were not significantly different, which indicates the Landfill Zone is not a source of radionuclide contamination.

Groundwater Downgradient of Landfill Zone

Two VOCs were detected in groundwater downgradient of the landfill during the RI at concentrations exceeding federal maximum contaminant levels (MCLs): 1,2-dichloroethane (1,2-DCA) (4.3 µg/L) and TCE (33 µg/L). The MCLs are 0.4 and 5 µg/L, respectively. During the SRI and FFS, there were no detections of VOCs downgradient of the Landfill Zone that exceeded ARARs. No PAHs detected in groundwater samples collected during the RI, SRI, and FFS from downgradient locations exceeded ARARs. Pesticides were not detected above ARARs in groundwater samples collected during the RI or FFS. During the SRI, the only pesticide detected downgradient of the landfill at a concentration above ARARs was dieldrin (0.076 µg/L). The MCL for dieldrin is 0.0002 µg/L. PCBs were not detected in downgradient groundwater samples collected during the RI, SRI, or FFS. The landfill does not appear to be a source of PAH, pesticide, or PCB contamination in downgradient groundwater. During the RI, zinc (120,000 µg/L) was detected in downgradient groundwater samples at a concentration that exceeded the ARAR (5,000 µg/L).

Seven total metals were detected in downgradient groundwater samples during the SRI at concentrations that exceeded ARARs: barium (2,480 µg/L); beryllium (11 µg/L); chromium (109 µg/L); iron (227,000 µg/L); lead (211 µg/L); manganese (12,000 µg/L); and, thallium (512 µg/L).

The ARARs for these metals are 1,000, 4, 50, 300, 50, 50, and 2 µg/L, respectively. Three metals were detected in downgradient groundwater samples during the FFS at concentrations above ARARs: antimony (12 µg/L); iron (2,200 µg/L); and manganese (260 µg/L).

ARARS for these metals are 6, 300, and 50 µg/L, respectively. A statistical analysis of the central tendency of these metals showed that downgradient concentrations were not statistically

higher than upgradient concentrations. This indicates the landfill does not contribute significantly to metals concentrations in groundwater downgradient of the landfill.

Gross alpha and gross beta radionuclides were detected in downgradient groundwater samples during the RI, SRI, and FFS at activities that exceeded ARARs. Maximum gross alpha and gross beta radionuclide activities detected were 315 J and 623 J pCi/L, respectively. The ARAR is 15 pCi/L. However, gross alpha and gross beta radionuclides were also detected during these investigations in upgradient groundwater samples. Downgradient gross alpha and gross beta radionuclide activities were determined to be statistically similar to upgradient activities, indicating the landfill is not a significant contributor to radionuclides in groundwater.

Groundwater within Landfill Zone

One VOC, 1,2-DCA (2.6 µg/L), was detected in groundwater samples from within the interior of the landfill during the RI at a concentration exceeding the ARAR (0.4 µg/L).

Three VOCs were detected in groundwater samples from within the interior of the landfill during the SRI at concentrations exceeding their respective ARARs: chlorobenzene (103 µg/L), methylene chloride (2,223 µg/L), and TCE (21.1 µg/L). The ARARs for these compounds are 100, 5, and 5 µg/L, respectively.

Three VOCs were detected in groundwater samples from within the landfill interior during the FFS at concentrations exceeding their respective ARARs: benzene (17 J µg/L), chlorobenzene (250 µg/L), and 1,2-DCA (5.4 J µg/L). The ARARs for these compounds are 5, 100, and 0.4 µg/L, respectively.

No PAHs detected in groundwater samples collected during the RI, SRI, and FFS from landfill locations exceeded ARARs. Pesticides were not detected above ARARs in groundwater samples collected during the RI or FFS. During the SRI, four pesticides were detected within the landfill interior at concentrations above their respective ARARs. The pesticides were aldrin (0.015 µg/L), alpha-BHC (0.019 µg/L), dieldrin (0.096 µg/L), and heptachlor (0.07 µg/L). The ARARs for these pesticides are 0.002, 0.006, 0.0002, and 0.008 µg/L, respectively. PCBs were not detected in groundwater samples collected within the landfill interior during the RI, SRI, or FFS.

Four total metals, antimony (110 µg/L), beryllium (7 µg/L), lead (65 µg/L), and mercury (9 µg/L), were detected in groundwater samples collected within the landfill during the RI at concentrations that exceeded ARARs. The ARARs for these metals are 6, 4, 50, and 2 µg/L, respectively.

Ten metals were detected in landfill groundwater samples at concentrations that exceeded ARARs during the SRI: arsenic (274 µg/L); barium (9,480 J µg/L); beryllium (10.7 µg/L); cadmium (12 µg/L); chromium (539 J µg/L); iron (730,000 µg/L); lead (385 µg/L); manganese (83,400 J µg/L); nickel (299 J µg/L); and thallium (965 J µg/L).

The ARARs for these metals are 50, 1,000, 4, 5, 50, 300, 50, 50, 100, and 2 µg/L, respectively. Two metals were detected above ARARs in groundwater samples collected within the landfill during the FFS. The metals include iron (13,000 J µg/L) and manganese (2,500 µg/L). ARARS for these metals are 300 and 50 µg/L, respectively. Two anions, fluoride (110,000 µg/L) and nitrite (6,100 µg/L), were detected above ARARs in groundwater samples collected within the landfill. Their respective ARARs are 4,000 and 1,000 µg/L.

Gross alpha and gross beta radionuclides were detected in groundwater samples collected within the landfill at activities that exceeded ARARs during the RI, SRI, and FFS. Maximum gross alpha and gross beta radionuclide activities detected were 180 J and 485 J pCi/L, respectively. The ARAR is 15 pCi/L. Total gross alpha radionuclide activities within the landfill were significantly lower than activities in upgradient groundwater.

In summary, the landfill was not found to contribute significantly to downgradient groundwater contamination because contaminants detected downgradient of the landfill were also frequently detected upgradient of the landfill. Areas within the landfill had significantly higher concentrations of some VOCs and metals, but these compounds did not appear to have migrated beyond the site boundary.

1.3 Radiological Concerns

Numerous studies have been performed at the OU2 Landfill Zone to evaluate the potential for contamination by radionuclides including: Installation Restoration Program Records Search (1983), IRP Phase II (1987), RI (1990), Supplemental RI (1995), FFS (1996), Operable Unit 5 RI (2001), RCRA Facility Assessment (RFA) (2005), Long-Term Monitoring for Radiological Parameters (2006), and additional monitoring performed in 2007 by LAC.

As noted above, Lowry was primarily a training base through its history, training soldiers in a variety of subjects from baking to missile armaments. Documentation indicates that only dummy materials were used in the training exercises, and the permit history, reviewed extensively during the RFA, documents that very limited quantities of radioactive materials were used at the base and limited to such items as calibration sources, test samples, electron tubes, radium paints and well-documented pieces of uranium ore.

The only evidence of any potential disposal of radionuclides within OU2 is a reference to low level radioactive electron tubes on a 1951 real estate map and a 1952 real property record; however, documentation of its actual location or evidence of a release related to the drum have not been found in any of the numerous historical investigations. In addition, the Air Force instituted a policy to dispose of radiological wastes to licensed commercial sites in the 1958-1959 timeframe.

Historical investigations at OU2 included analysis for gross alpha and gross beta in numerous samples beginning in 1988 and expanded analysis for twenty radionuclides as well as total uranium. The expanded analyses included isotopes of radium, uranium, plutonium, thorium,

americium, tritium, carbon, nickel, strontium, promethium, rhenium, potassium, cobalt and cesium. None of the anthropogenic isotopes were detected above regulatory standards. Uranium concentrations above the State standard of have been found in groundwater throughout all the investigations within the landfill, upgradient of the landfill and downgradient on the northeast corner. The conclusion derived and confirmed from the investigations is that the elevated uranium is naturally occurring and is within the range that can be expected in the Front Range and Denver Basin.

Current post-closure monitoring performed at the landfill include gross alpha, a surrogate for uranium, has not identified concentrations of gross alpha as statistically higher downgradient, confirming that the concentrations are not due to a release from the landfill.

1.4 Closure Activities

As a result of the findings of the RI, SRI and FFS, a remedy was selected for closure of the OU2 Landfill under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process, and described in the May 1998 Proposed Plan (Proposed Plan). The Proposed Plan evaluated thirteen (13) different remedial options, including the current engineered cap. Please note that while the remedy was selected in accordance with CERCLA and the National Contingency Plan (NCP), the implementation of the corrective action was performed by LAC under its Consent Agreement.

As described in the Phase 2 Corrective Action Plan (Phase 2 CAP) for OU2 (MDC, November 2003), the final cover design included construction of an 18-inch-thick low permeability layer (LPL) with a maximum hydraulic conductivity (permeability) of 1×10^{-5} centimeters per second over the entire area using soil from offsite borrow sources; placement of a 6-inch-thick vegetative layer of the LPL using soil imported from offsite borrow sources; installation of landfill gas vents and monitoring probes in culvert extension bedding material and around the southern and western perimeters of the landfill on 200-foot centers; and construction of surface water structures to control run-on and runoff from the 100-year, 24-hour storm. Import and stockpiling of soil began in late 2003, and construction was completed in the fall 2004. The Draft Closure Report was submitted to the Department in March 2005 by LAC.

According to the FFS, the closure method was selected to be protective of human health and the environment and was designed to meet specific Remedial Action Objectives (RAOs), which are media-specific goals that were developed for the OU2 Landfill based on site-specific and chemical-specific risks and regulatory requirements. Regulatory requirements include chemical-specific, location-specific, and action-specific ARARs for landfill closure. Remedial action objectives developed for the OU2 Landfill closure were as follows:

- Landfill Soil/Solid Wastes/Construction Debris and Rubble - Prevent exposure to or contact with the landfill mass; reduce the potential for leachate generation from surface water, precipitation, or irrigation infiltration, including ensuring site grading is sufficient for drainage of surface water; prevent the potential for instability and erosion of the

landfill mass, including preventing erosion of the banks of Westerly Creek; and reduce the overall site safety hazard by removing construction debris, fly ash, and miscellaneous trash and restoring adequate cover vegetation.

- Surface Water - Reduce the potential for surface water degradation through contact with the landfill mass; reduce the potential for leachate generation from surface water, precipitation, or irrigation infiltration and contact with the landfill mass by ensuring site grading is sufficient for drainage of surface water; and prevent the potential for erosion of the existing cover soil and instability of the landfill mass, including preventing erosion of the banks of Westerly Creek.

- Groundwater - Prevent potential contact with or use of groundwater within the landfill; minimize the potential for additional groundwater quality degradation by reducing the potential for leachate generation from surface water, precipitation, or irrigation infiltration through the landfill mass by ensuring site grading is sufficient for drainage of surface water; and prevent the migration of contaminants in groundwater beyond the boundary of the Landfill Zone.

- Leachate - Reduce the potential for leachate generation by surface water, precipitation or irrigation infiltration and surface water contact with the landfill mass, including ensuring site grading is sufficient for drainage of surface water; prevent potential contact with leachate within the area of the landfill mass; and prevent the migration of contaminants in leachate beyond the boundary of OU2.

- Landfill Gas - Prevent the uncontrolled accumulation of gas within the landfill and the release of landfill gas above the State threshold limit at the OU2 boundary; prevent lateral migration of landfill gas beyond the boundary of OU2; prevent exposure to or contact with landfill gas; and prevent emissions of untreated landfill gas that contains compounds of concern above chemical-specific air permitting requirements. Remedial action objectives can be achieved by eliminating exposure pathways associated with identified contaminants, enacting institutional controls that serve to eliminate exposure pathways, or removing the source of contamination.

It is important to note that while the closure activities in the Proposed Plan achieved the above goals described in the FFS and the Phase 2 CAP, the closure was based upon a future use as open space/non-irrigated park. It was noted in the Proposed Plan that any future change in land use would be possible only if it could be demonstrated that the change in use would not increase the potential threat to human health and the environmental, and the proposed changed is reviewed and approved by CDPHE. CDPHE approved the final construction report for the new soil cap at OU2 in September 2006.

A Draft Post Closure Operations and Maintenance (O&M) Plan was submitted to the Department in November 2003, along with the Final Phase 2 CAP for OU2 Landfill Closure, which was approved by the Department in March 2004. This O&M Plan was prepared in accordance with

the Consent Agreement and the applicable sections of the Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities (6 Colorado Code of Regulations (CCR) 1007-2). In accordance with the CDPHE-approved Phase 2 CAP for OU2, LAC initiated the 30-year post-closure monitoring period in November 2006.

As part of the maintenance plan, the landfill is inspected routinely to maintain:

- the integrity of the cap;
- surface conveyance structures;
- soil vents and probes; and,
- the fence surrounding the landfill.

An annual operation and maintenance summary report discussing the surface and drainage structure inspections for Year 1 of post-closure has also been submitted to the CDPHE. Groundwater, surface water, and soil gas monitoring are also ongoing following the schedule set forth in the Phase 2 CAP. Through March 2008, six of eight quarterly monitoring events scheduled for post-closure Years 1 and 2 have been completed and summary reports have been submitted to CDPHE.

Soil gas monitoring is being conducted to ensure that any detected methane gas concentrations in the subsurface soil do not exceed the lower explosive limit (LEL) of methane. Twenty-seven (27) aboveground monitoring probes, located in the western and southern portion of the OU2 landfill, were installed to monitor for the presence of methane gas. Through the first six quarters of post-closure monitoring, none of the sporadic detections of methane in soil gas probes have equaled or exceeded the action levels set forth in the Phase 2 CAP.

Groundwater and surface water sampling is being conducted to monitor water quality and to detect potential leachate contamination that may originate from OU2. The monitoring network set forth in the Phase 2 CAP includes ten groundwater monitoring wells and three surface water sample locations along Westerly Creek. During the first two years of post-closure monitoring, groundwater and surface water samples are being collected quarterly and analyzed for general water quality parameters, metals, volatile organic compounds, and radionuclides (gross alpha and gross beta). Eight consecutive quarters of groundwater sampling will be conducted to establish a post-closure statistical baseline for OU2 groundwater conditions. Of these eight, six quarters of groundwater and surface water sampling have been completed.

The results currently indicate that all groundwater and surface water samples were non-detect or below the applicable state and federal regulatory standards for VOCs. Total metals results indicate that no groundwater or surface water samples exceeded applicable drinking water Maximum Containment Levels (MCLs). Gross Alpha is being detected in surface water and groundwater at all of the upgradient and downgradient wells at OU2. The Gross Alpha results for the surface water are below the CDPHE standards whereas concentrations in most of the upgradient and downgradient wells exceed the CDPHE's groundwater standard of 15 pCi/L; this

condition is consistent with naturally occurring uranium levels found throughout the front-range of Colorado.

As noted above, a statistical baseline for groundwater conditions is being compiled during the first eight quarters of post-closure monitoring. After the baseline population is completed, the statistical evaluation will be used to assess whether or not there are impacts to groundwater being derived from the OU2 landfill versus those from upgradient contributions. The statistical evaluation through the first six quarters of compiled data indicates no statistically significant increases between upgradient and downgradient monitoring wells for VOCs. For metals, one downgradient observation for thallium equaled, but did not exceed the upper prediction limit (UPL) of 0.013 mg/L. The October 2007 Gross Alpha concentration from downgradient monitoring well LFPOC13 (reported as 90 +/- 15 pCi/L) slightly exceeded the calculated UPL of 88 pCi/L in October 2007. However, the January 2008 Gross Alpha result (65 +/- 11) for the same well was again below the UPL as were all results prior to the October 2007 event and this well is located on the east side of Westerly Creek and does not appear to be downgradient of the disposal areas. Based on the post-closure monitoring data compiled and reported to the CDPHE thus far, there are no adverse impacts to groundwater associated with the OU2 and the implementation of the current closure.

2.0 Conceptual Cap Modifications

The redevelopment and design intent for the 80 acres that make up the Lowry Vista project is to create a new mixed-use neighborhood that ties to the surrounding community and encourages a variety of activities (Figure 5). The proposed development shall accommodate a mix of uses, such as retail, entertainment, hotel, office, and residential among other uses, integrated into a variety of outdoor plazas and landscapes. Lowry Vista's ultimate theme of the development is to tell the "story" of recycling disturbed land. Lowry Vista is designed to be a flexible, phased development that can evolve and change as market conditions dictate. The proposed streets will provide an infrastructure of developable parcels which can be conveyed as separate entities or developed comprehensively. The conceptual cap modifications discussed below are based upon the General Development Plan submitted to the City and County of Denver. Appendix A provides the General Development Plan for the Lowry Vista project.

2.1 General Development Plan

The development concept for Lowry Vista will be guided by the following:

- Create a neighborhood that incorporates multiple uses, including live work possibilities, public services and appropriate public spaces
- Plan a pedestrian friendly environment which incorporates bicycle, vehicle and pedestrians
- Provide streets of major image and character, creating walk-able streets that work together as a planned cohesive development hosting a variety of activities

- Create an environment that welcomes walking, strolling, shopping, stopping, sitting, watching, and conversing
- Accommodate a wide mix of uses, such as retail, entertainment, hotel, office, and residential
- Develop open spaces to serve multiple needs
- Create a park space for the surrounding neighborhoods
- Provide a broad mix of housing types, densities and price ranges
- Create a unique, distinctive and identifiable development that unites all characteristics of the existing site (landfill, sustainability, recycling)
- Develop the site to be creative in the use of storm detention, water quality, wildlife habitat and passive recreation
- Encourage neighborhood & regional public transportation

Design Intent

Architectural Character

The dam that embraces the existing natural drainage area to the north and west, Alameda Avenue to the south, and the Mira Vista Golf Course to the east isolate the development property of Lowry Vista. While initially this seems an obstacle, the richness of the adjacencies offers tremendous and unique opportunities for the Lowry community separate from the influences of the historical Lowry Air Force Base.

The Lowry Vista development will draw its architectural and material influences from its immediate context of the Natural Area, the visual connection to the Rocky Mountains, and the influence of the landfill reclamation. When considering urban design strategies, a dedication to making the most of the land reclamation has led to a mixed use strategy of concentrating a variety of uses along Main Street and adjacent side streets including; retail, commercial, hotel, office and residential. Environmentally sensitive materials that evoke the beauty of the natural surroundings in durability, texture, and color will be encouraged to ensure execution of the overall intent. The west parcel is envisioned as primarily residential similar to the development of the adjacent AMLI Lowry Development.

Street Character

The street system is intended to be private streets. The primary focus of this development is to encourage pedestrian activity through the creation of an environment that offers a quality experience for people. The scale of buildings and their relationship to the streets combined with the scale and detail of paving, landscape and site elements, encourage walking and offer a variety of pedestrian experiences. A variety of amenities and elements that tell the “story” will be dispersed throughout the development to enhance the experience. Buildings will be oriented toward the street or primary pedestrian circulation routes and ground floor retail will reinforce the pedestrian level experiences. There will be identifiable pedestrian entry points to the buildings from the street. Some of the streets may feature parallel and/or diagonal parking on

one or both sides providing close access to uses and a buffer between the pedestrians and moving traffic. Way-finding will be enhanced through clear pedestrian corridors.

At the center of the development is a Main Street that is intended to not only serve pedestrians and the automobile, but also to create the framework of internal organization. Retail mixed-use building fronts line the street to make the space village-like and scaled for the pedestrian that connect the site access points to the natural amenity to the north. Walks, street trees, lighting, furniture, signs and the architecture will all combine to create a clear, consistent language that provides a cohesive and unique image to the development. The street will provide on-street parking for convenience and activity and the orientation of Main Street towards Long's Peak will center on the vista.

Parks, Open Space and Trails

Publicly accessible and usable open space will be integrated within the overall development. The open space system will consist of open space amenities to accommodate the public and connect to the surrounding uses. Typical landscape development practices of expanses of irrigated turf and water demanding plant life will not be appropriate for this reclamation effort and therefore alternative, more contextually sensitive plant material and landscape practices will be implemented with the desire of creating a unique and natural experience in the Denver area.

Mix of Uses

The development will feature horizontal and vertical mixing of uses. The areas adjacent to Alameda Avenue are anticipated to contain retail and or restaurant uses. The buildings facing Main Street will be retail with residential above and the edges of the development will be predominantly residential. Lowry Vista's Revised Closure anticipates that there will be several restrictions in place, similar to the groundwater restrictions for Operable Unit 5, which would allow for these types of uses once the current Closure is modified, and that those restrictions would be protective of human health and the environment.

Residential

The plan currently anticipates a range up to 950 units, or 13 Du/acre, east of the dam and will include a variety of rental and for sale products. The R-2-A parcel will be a maximum of 247 units, or 23 Du/acre, per Ord. No. 604.

Retail

The plan currently anticipates and range up to 450,000 square feet of retail uses. Most of the retail will be located along Alameda Avenue and Main Street, but some small retail and restaurant uses could be developed throughout the site, depending on market conditions.

Hotel

If supported by the development market, the hotel currently anticipates a range up to 250 rooms with approximately 75,000 square feet.

Office

The plan currently anticipates a range up to 120,000 square feet of office space. The majority of office space will be at the second story and above level, but additional office space could be developed at select locations throughout the site, depending on market conditions.

Building Heights

Maximum building heights for the new development will be limited by the Denver Municipal Code based on the proposed zone classifications. The concept is to provide a diversity of building heights throughout the project. The site slopes to the north so as the buildings step up, the site slopes away from Alameda Avenue. The west side of the dam will be similar to the existing AMLI project and will follow their height model. Along Alameda Avenue, the intent is to have 1-2 story building and step up the height toward the north of the development with the maximum height of 8 stories.

Parking

Retail, office and residential parking will be provided in parking structures or surface lots throughout the site and collectively will provide approximately 5,246 spaces. Parking garages will be planned to be integrated within the building development. On-street parallel and/or diagonal convenience parking is planned to support the commercial and residential uses. In addition, dedicated and or shared parking will be provided where appropriate. The west side of the dam will park according to the requirements of the existing zoning.

2.2 Potential Cap Modifications

In order to accomplish the development described above, IRGI anticipates that several modifications to the existing closure plan and final construction design will need to be made. All modification will be made consistent with State of Colorado statutes and regulations, including the modifications to the State Environmental Covenant. Based on the current site plan in Figure 6, penetration into the cap for redevelopment would occur on approximately 32.5% of the total landfill area. In addition, there would be some limited penetration into the cap in various areas for geotechnical/predesign studies as further described below. Permits required for potential cap modifications are included in Appendix B.

The potential modifications to Phase 2 CAP include:

- Geotechnical/predesign studies that would require penetrations of the cap;

- Grading that results in temporary removal of the cap and the potential for encountering waste materials in the landfill;
- Additional filling of the landfill area with clean fill to achieve project grades;
- Installation of clean utility corridors;
- Construction of buildings, parking lots, and roadways over the existing cap;
- Installation of landscape elements into the development.

Engineering controls will be put into practice that assures protection of human health and the environment during construction activities. In order identify and implement these engineering controls during development, a Material Management Plan for Lowry Vista will be provided to the Department for its review and approval. Geotechnical investigations and other predesign studies will need to occur prior to the finalization of the Revised Closure Plan. Specific engineering controls will also be proposed for this development that will assure that the final cap after development is better than or equal to the existing cap. For example, special engineering controls will be required of the development when trees are planned into a landscape, special provisions will be taken to assure that water will be contained within an engineering structure that prevents drainage into the landfill. As such, Section 3.0 of this report goes into detail on the design investigations that are likely to be needed. A draft Materials Management Plan in also included with this document for review.

In addition to design investigations, site preparation activities associated with the proposed redevelopment, such as utility corridors and road installation, are likely to include excavation of soil and waste materials and placement of soils on the site. Excavations are likely to include lowering the grade near Alameda to accommodate transition from the grade level of Alameda to the development, and the excavation of soils and possibly waste materials to provide the compensatory volume in the Westerly Creek flood pool, and the preparation of clean corridors for utility installation. The compensatory volume is needed to meet the requirements of the Army Corp of Engineers (COE) and Urban Drainage with respect to the development's impact on the Westerly Creek Flood pool. Imported soil will also be brought to the site to achieve the design grade for building on the landfill and to provide for clean areas in which to install utilities. It is recognized that installation of utilities will need to be in clean fill or clean corridors. Details on these activities will be presented in the 60% design document.

Section 2.3 discusses how the conceptual cap modifications will compare to the existing cap and to the standards set by CDPHE for protection of human health and the environment.

2.3 Comparative Analysis of Cap Modifications

Due to the timeframe in which this landfill received final waste disposal from the U.S. Air Force, the required closure of the OU2 Landfill at Lowry meets the applicable minimum requirements in the Solid Waste Regulations, (6 CCR 1007-2. January 10, 1983). These minimum requirements include the following:

- At least two feet of soil over the entire fill area;

- Surface drainage to prevent ponding and erosion;
- Orderliness, good aesthetic appearance, capable of blending with surrounding area;
- Concentration of explosive gases less than five percent in air at the site boundary;
- No water pollution at or beyond the site boundary;
- No nuisance conditions at or beyond the site boundary;
- Post-closure monitoring and maintenance program.

Any proposed change in landfill use will need to be protective of human health and the environment, will need to meet the RAOs described in Section 1.4 and will need to meet the minimum requirements set forth above. Based on the Conceptual Development Plan and the list of potential cap modifications discussed above, analysis of the proposed Cap modifications as compared to the above criteria follows:

- At least two feet of soil over the entire fill area - The current cap has a two foot soil cover that consists of 18 inches of clean compacted soil and six inches of topsoil. The proposed development will include the import of significant additional quantities of cover soil to augment the existing cap, to minimize penetrations of the cap and exposure to waste materials, and to achieve the base grade for the development. In the end once development is complete, all areas of the capped landfill will have a minimum of two feet of soil cover; nearly 60% of the landfill will have greater than two feet of cover. Figure 6 shows the conceptual cut and fill map for the proposed development. In addition to the fill to make grade, nearly the entire site will be covered with additional cover achieved through the construction of buildings, parking lots and structures, roadways and other hardscape. Since this additional cover will be impervious to the infiltration of water and the depth of the existing cap will be increased over much of the site, the proposed development provides a more substantial cover than currently exists.

- Surface drainage to prevent ponding and erosion - The current cap is graded to drain stormwater into the wetlands behind the Westerly Creek Dam. The proposed development will also need to drain storm water and prevent ponding. As stated above, the majority of the proposed developed area will be covered with buildings, parking lots, roadways and other hardscape that is impervious to the infiltration of stormwater and as such, the proposed development will be designed to drain to subsurface conduits that discharge to the wetlands behind Westerly Creek Dam. As a requirement of the design, at no time will drainage of rainwater or water used for washing or landscaping purposes into the landfill mass be allowed. In addition, the developed area will prevent erosion in the area of the landfill mass since the stormwater will be run-off from buildings, parking lots, etc.

- Orderliness, good aesthetic appearance, capable of blending with surrounding area - The proposed development is subject to the Lowry Design Guidelines that dictate the aesthetic appearance of the development and provides architectural directives for any buildings.

- Concentration of explosive gases less than five percent in air at the site boundary - There have been no historical incidents of explosive gases being found in the OU2 Landfill Zone that are greater than two percent in air. However, any structure built as part of the proposed development will contain an active sub-slab depressurization system (or equivalent gas mitigation system) to prevent the buildup of any potential explosive gas. Ongoing monitoring of potential explosive gas at the boundary will be included as part of a Long-term O&M Program that will be prepared and submitted and part of the Final Revised Closure Plan for the OU2 Landfill Zone.

- No water pollution at or beyond the site boundary - The current closure was installed based on data that indicated that there was no water pollution at or beyond the site boundary. Any proposed development would need to be prepared to address future issues from water pollution that may arise through ongoing monitoring.

- No nuisance conditions at or beyond the site boundary - There are no known nuisance conditions at or beyond the site boundary that are addressed by the current cap. Any proposed future development would need to assure that mitigation systems and approaches to construction were in place to minimize nuisance conditions such as noise, odor, dust, blowing trash, sediment run-off during construction, and other conditions. It is assumed that these issues will be addressed by the permits and plans that are needed for construction and that ongoing mitigation of such conditions will be part of the development.

- Post-closure monitoring and maintenance program - The current closure is approximately two years into an approved Post-closure monitoring and maintenance program. Any proposed development would require that a revised plan be prepared and submitted to CDPHE for approval; any such plan would meet CDPHE statutes and regulations for post-closure activities.

3.0 Design Investigations

IRGI provides the following general scope of work for geotechnical borings, test pits and exploratory trenches. These investigations will be conducted in accordance with the Materials Management Plan for Lowry Vista and the site-specific Health and Safety Plan developed for this project. IRGI has provided in Appendix C the Health and Safety Plan associated with LAC's activities at Lowry as an example. Prior to commencement of any of these activities, IRGI will required the approval of the Department and the U.S. Air Force in accordance with the current restrictions at Lowry Vista. Permits required for design investigations are included in Appendix B.

3.1 Geotechnical Borings

As a part of the design investigations, geotechnical borings will be placed at numerous locations within OU2 over the course of several years of development. It is anticipated that some of the

studies will be focused on generalized geotechnical information on the entire fill, including the waste mass in trenches, and some of the studies will be specifically focused on different parcels within Lowry Vista.

Test boreholes will be drilled at locations to evaluate the subsurface profile including depths to bedrock and groundwater, and to perhaps obtain samples for laboratory testing for geotechnical purposes. The test holes will be drilled to depths of 15 to 30 feet (or practical rig refusal) across the subject parcel, away from the areas underlain by waste disposal trenches. The final test hole depths will be determined in the field, however, as the subsurface profile becomes evident.

Test boreholes will be drilled at locations to assist delineating the locations and extents of the waste trenches beneath the site. These test holes will be advanced to depths of 15 to 20 feet. Samples will be collected from the test holes to evaluate relevant engineering characteristics of on-site materials. The results will be used to develop geotechnical recommendations for appropriate foundation and floor system types, project earthworks and utility installation, and preliminary pavement sections.

All boreholes will be continuously sampled and logged for lithology. Information that shall be recorded on the Lithologic Log includes the borehole location; drilling information; sampling information such as sample intervals, recovery, and blow counts (if applicable); waste material encountered, and sample description information. A measurement of the sample with a photo-ionizing detector (PID) will be collected every two feet. Lithologic descriptions of unconsolidated materials encountered in the boreholes will generally be described in accordance with American Society for Testing & Materials (ASTM) D-2488-90 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM, 1990). Descriptive information to be recorded in the field shall include:

- Identification of the predominant particles size and range of particle sizes;
- Percent of gravel, sand, fines, or all three;
- Description of grading and sorting of coarse particles;
- Particle angularity and shape;
- Maximum particle size or dimension;
- Plasticity of fines;
- Color (using Munsell Color System);
- Moisture (dry, wet, or moist);
- Consistency of fine grained soils;
- Structure of consolidated materials;
- Cementation (weak, moderate, or strong); and,
- Identification of the Unified Soil Classification System group symbol.

Additional information to be recorded includes the depth to the water table, caving or sloughing of the borehole, nature and extent of waste material encountered, changes in drilling rate, depths of samples, presence of organic materials, presence of fractures or voids in consolidated

materials, and other noteworthy observations or conditions, such as the locations of geologic boundaries.

Investigation-Derived Waste (IDW) Handling

IDW drill cuttings shall be placed either into 55-gallon drums or rolloff by the drilling contractor. Drill cuttings shall be segregated based on saturated and dry cuttings with saturated cuttings containerized and dry cuttings spread out on the ground surface. Each drum shall be filled to 90-percent of capacity and sealed with a compatible lid. IDW decontamination water will be placed into 55-gallon drums. All IDW will be properly characterized for appropriate disposal. All IDW will be properly manifested by IRGI according to the IDW characterization results and properly disposed of at the appropriate disposal facility.

Borehole Abandonment

Total borehole depth and depth to static water (if encountered) will be measured at each borehole prior to abandonment. Wells will be abandoned by filling the borehole with bentonite chips. The bentonite chips shall be hydrated with potable water poured directly down the borehole. The top five feet of the hole shall be filled with materials less permeable than the surrounding soils.

3.2 Exploratory Test Pits

Exploratory test pits may also be utilized with geotechnical borings to determine the subsurface characteristics of the site. Again, these test pits may be placed at numerous locations within the former landfill and it is anticipated that these borings will be installed during numerous studies over the next few years.

Test pits will be advanced using a trackhoe perpendicular to and along the periphery of the trenches identified in the aerial photographs, as shown on Figure 2. Test pit explorations will be advanced to define the nature and extent of waste material. Near-surface soils will be segregated in order to restore the cap to design specifications in accordance with the Hazardous Waste regulations on staging. Each test pit will be logged by a field geologist and the location documented using GPS. The field geologist/engineer will log soils to identify where landfilling has occurred. Native soil deposits have a greater density than disturbed or fill soils, and disturbed (previously excavated) areas are readily apparent during excavation. In order to evaluate potential soil quality impacts associated with the disposal trench the field geologist will log excavated soil based on visual evidence of debris/contamination.

If no visually impacted materials are observed in a portion of a test pit, that portion will be backfilled compacted to within two feet below original grade. The remaining test pit will be backfilled with the excavated material and the cap restored to the design specifications.

If visually impacted materials are encountered during test pitting, the waste will be handled under the Materials Management Plan for characterization, excavation, and or disposal. During installation of exploratory test pits, any material removed from the pit that appears to be visually impacted, will be segregated on 6 mil poly, and covered to minimize exposure to rain and wind, until characterization of the material is complete. If characterization results indicate the material requires special waste handling, Section F of the Materials Management Plan will be followed and the material will be loaded directly into roll-offs for appropriate disposal. Additional excavation will not be conducted if buried drums or hazardous materials are encountered. The occurrence will be documented, staked, and located using GPS. Native soils or MSW that are removed from the test pit, that do not appear to be impacted, will be segregated and placed on 6 mil poly to be later be reused on Site or used to backfill the exploratory test pits. Once the material has been properly backfilled the remaining pit will be backfilled with the original surface excavated material and the cap restored to the design specifications.

The test pits will not be widened to remove additional materials during this exploratory phase; it is anticipated that all materials existing within test pits are part of a closed landfill and excavation of these materials is not required for disposal.

3.4 Exploratory Trenching

On an as-needed basis, IRGI may need to excavate larger test pits or cut trenches through the waste materials and soils at the site to characterize the materials that may be encountered during development-related excavations. It is the intention of Lowry Vista to excavate these trenches and to exhume waste for visual characterization only. Any waste that is excavated from burial trenches will be segregated for characterization and the cap restored to design specifications. Lowry Vista will assure that mitigation measures are in place and follow the Materials Management Plan for the handling of all waste material.

Exploratory trenching may be performed along the boundaries of the landfill area to identify and evaluate the vertical and lateral characteristics and the nature of the waste material in the disposal trenches identified on the aerial photographs. During installation of exploratory trenching, any material removed from the trench that appears to be visually impacted (non MSW), will be segregated on 6 mil poly, and covered to minimize exposure to rain and wind, until characterization of the material is complete. If characterization results indicate the material requires special waste handling, Section F of the Materials Management Plan will be followed and the material will be loaded directly into roll-offs for appropriate disposal. Additional trenching will not be conducted if buried drums or hazardous materials are encountered. The occurrence will be documented, staked, and located using GPS. Native soils or MSW that are removed from the trench, that do not appear to be impacted, will be segregated and placed on 6 mil poly to be later be reused on Site or used to backfill the trenches. Once the material has been properly backfilled the remaining trench will be backfilled with the original surface excavated material and the cap restored to the design specifications.

Discovery and Handling of Visually Impacted Materials

In the event that visually impacted materials are encountered, IRGI will proceed as follows:

1. A written description and a sketch of the location of the material will be documented in the field notebook.

2. Based on the type of material encountered, appropriate equipment will be used during removal of these materials.

3. Visually impacted materials will be removed with care taken to avoid spreading the contamination into an uncontaminated area.

4. The removed materials will be segregated and stockpiled separately from contaminated and uncontaminated soils. The stockpiled materials will be designated for appropriate disposition as discussed in the materials management plan or replaced into the trench and covered.

Stockpiles

Excavated impacted soil will be placed in temporary stockpiles adjacent to the exploratory trenches in accordance with the Colorado Hazardous Waste regulations. Clean overburden removed from the excavations will be placed in the clean stockpile area. Stockpiles will be constructed to protect stored material from erosion by wind and rain. Contaminated soils and visually impacted materials will be stored on a 10-mil nominal thickness impermeable polyethylene liner for short-term storage (less than 90 days) and will be covered with a polyethylene liner (minimum 6-mil thickness). Berms will be constructed surrounding contaminated soil and visually impacted material stockpiles to contain any leachate. The top liner will be weighted down with a series of ropes/sandbags or netting to prevent uncovering from wind. Construction and placement of these liners will be such that surface water runoff and rain do not come in contact with the contaminated soils/materials. Any stockpiles left in place will be inspected and maintained regularly to ensure the cover and bottom liner material remain intact and that any liquid leachate is contained in the leachate collection system described in the next subsection. Stockpiles will be placed in an area that has been graded smooth. All material that may puncture the liner, including large rocks, branches, or metal debris will be removed prior to placement of the stockpile liner. Where necessary, the area will be graded to ensure that water drains to the collection sump described in the next subsection.

Leachate Collection

It is not anticipated that stockpiled soils will generate liquids. However, if unexpectedly wet soils are encountered, contaminated soil stockpiles will be constructed to drain generated liquids (primarily water that leaches out of excavated soil) to a common sump. The sump will be excavated from the ground surface, lined with polyethylene, and have a layer of clean gravel placed in the bottom to hold it in place. A berm will be constructed around the sump to prevent

inflow from sources other than impacted soil leachate. Liquid in the sump (if present) will be pumped into a chemically compatible container. The contractor will minimize generation of wastewater through best management practices, including diverting runoff outside the stockpile areas and draining the rain falling on the stockpile covers outside the drain collection area. Water draining from the clean overburden stockpiles will be directed away from the sump that collects water from the impacted soil stockpiles. Accumulated liquids will be disposed of at off-site disposal facility.

Soil Containers

Soil destined for off-site disposal will be placed in lined, transportable containers that will be kept in the designated stockpile area. After soil has been placed in the containers and sampled for waste designation in accordance with disposal facility requirements, the containers will be covered and secured. The condition of the containers and soil will be determined during weekly inspections by IRGI. Containers will be managed as if they were hazardous waste, but labeled "Pending Analysis" until such time as test results on the corresponding waste designation samples demonstrate that the soil is hazardous or not. Based on analytical results, the container labels will be changed to reflect the waste's regulatory status as hazardous or non-hazardous.

4.0 Draft Materials Management Plan

The Draft Materials Management Plan (MMP) for the Lowry Vista project is attached as Appendix D. This plan is intended to anticipate the activities that are likely to occur, such as pre-design investigations, site preparation activities, and excavation activities, and to outline the procedures to be followed when waste material is encountered. There is already an approved Soils Management Program for Lowry, which has been included for this review in Appendix D-1. Since a variety of waste material is expected to be encountered during intrusive activities, the MMP will provide for trained oversight, for the monitoring that will be employed during excavation activities, and will provide proper handling procedures for the waste materials that are anticipated. The following summarize the conceptual approach to the anticipated waste materials.

4.1 Asbestos

Asbestos disposal is regulated by the CDPHE Hazardous Materials Waste Management Division (HMWMD) as a solid waste (CDPHE 2002a). In addition, 6 CCR 1007-2 requires landfill operators to handle asbestos wastes separately from other wastes. Non-friable asbestos waste is accepted for disposal by many landfills as long as the landfill operator is contacted for approval prior to disposal. The following three Denver-area landfills are authorized to accept friable asbestos waste: *Denver-Arapahoe Disposal Site* at 3500 South Gun Club Road in Aurora (303-690-4303); *Conservation Services Inc*. at 41800 East 88th Ave. in Bennett (303-644-4332); and *Tower Landfill* at 8480 Tower Road in Commerce City (303-371-5115).

If asbestos is encountered during any excavation activities, work activities in the area will immediately cease and the material will be visually inspected. If the material is suspect, samples of the material and surrounding dirt will be submitted for PLM analysis or assumed to be asbestos-containing. Pertinent information regarding the location, type of debris, and quantity will be recorded and photographs taken. Pending results of the material and surrounding soil, work activities will cease and the material will be covered as to prevent a potential release.

Limited Quantity Non-Friable Material Discovery

If the material is deemed positive for asbestos (greater than 1%), is less than a 55-gallon drum (Regulation 8 trigger level), within a 10-foot radius, and not friable, the material will be packaged before being sent to a landfill. No additional surrounding soil is required to be removed. However, prospective disposal facilities should be contacted prior to disposal for any local/facility requirements.

Limited Quantity Friable Material Discovery

If the material is friable, less than a 55-gallon drum, and within a 10-foot radius, it shall be wetted and tightly sealed in a least two 6-mil, leak-tight polyethylene bags or in wrapping or other container deemed equivalent by the HMWMD and be disposed as friable asbestos-containing waste. Remove soils surrounding the friable debris discovery location and dispose of as solid waste. A report of discovery of material will be submitted to CDPHE.

The outermost layer of the packaging must be labeled with a waste shipment manifest label that gives the name and address of the generator of the waste and either of the following statements in letters at least 0.5 inches tall:

CAUTION
Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous to Your Health

or

DANGER
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard

Significant Quantity Non-Friable Material Discovery

Where non-friable material is identified, is greater than a 55 gallon drum, or greater than a 10 foot radius, the material will be packaged before being sent to a landfill.

Significant Quantity Friable Material Discovery

Where friable debris is identified and is greater than a 55-gallon drum, a remediation contractor will be required to remediate the material and surrounding soil in accordance with CDPHE Solid Waste Division. A report of discovery of material will be submitted to CDPHE.

4.2 Municipal Solid Waste

Soil and overburden (soil located above the municipal solid waste (MSW) will be used whenever possible as backfill material within the excavation or as cover for the reconstruction of Lowry Vista in accordance with Colorado Hazardous Waste and Solid Waste regulations. All MSW is expected to be delivered off-site for disposal.

In general, waste confirmation sampling is not expected to be performed as the limits of excavation will be dictated by the redevelopment project objectives and technical specifications, not a numeric clean-up goal. Excavated materials will be screened visually by trained personnel and by using a PID. Based on PID readings and visual observations, the excavated materials will be segregated as non-hazardous (clean fill or MSW) or potentially hazardous waste/special waste for further characterization and disposal. Excavated waste determined to be clean would be used for backfill. Trained waste inspectors will be present at each active excavation.

Waste that does not require special handling (non-hazardous MSW) will be loaded directly into trucks for transportation to a permitted RCRA Subtitle D solid waste disposal facility. MSW must be disposed of at a permitted solid waste disposal facility that meets the standards of 6 CCR 1007-2. Construction and other debris that may encountered in the trench locations (including tires) are not subject to any special handling, packaging or labeling requirements. Excavated, non-hazardous waste not taken directly off-site will be placed in temporary stockpiles on unexcavated portions of the Site and bermed with earthern material. A reinforced synthetic membrane will be placed on each stockpile, as required, to control odor and particulate emissions. Any drainage from the stockpiled refuse would be contained within the bermed area. Free liquids contained within the bermed areas would be permitted to flow back into the excavation, and the dewatering process would extract and treat contaminated liquids, as necessary.

Unless visual inspection dictates that special handling must occur, confirmation sampling will not be conducted following the removal of soil and MSW. However, waste requiring further sampling, will remain stockpiled and covered as described above until the waste has been characterized for disposal. Hazardous waste will be transported to a permitted RCRA Subtitle C hazardous waste treatment or disposal facility.

All wastes shipped for disposal off-site will be profiled in accordance with the requirements of the disposal facility accepting the waste, and in accordance with applicable laws. Transportation equipment used to haul MSW must prevent spillage, leakage, or dispersion.

Transportation of waste identified as nonhazardous would presumably go to Denver-Arapahoe Disposal Site located in Arapahoe County, Colorado, approximately 20 miles east of the Site while transportation of waste identified as hazardous would presumably go to the hazardous waste facility in Last Chance, Colorado, approximately 35 miles east of the Site.

4.3 Construction Debris

Construction debris will either be removed or placed as backfill on Site. Construction and other debris are not subject to any special handling, packaging or labeling requirements. The procedures used in MSW disposal will also be followed for construction debris, if disposed off site.

4.4 Oily Soil/Petroleum Products

If a significant amount of visually stained soil or petroleum contaminated soil (PCS) are encountered (that are not associated with an underground storage tank (UST) or leaking underground storage tank), IRGI will follow the *Colorado Department of Labor, Oil Inspection Section, Owner/Operator Guidance,* dated October 2005 and soil samples of the material will be collected. The analytical suite will include total petroleum hydrocarbons (TPH) diesel and gasoline and BTEX, as required by the Colorado Department of Labor and Employment, Division of Oil and Public Safety (OPS). The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated.

All samples collected are required to be analyzed for BTEX. These compounds should be analyzed using USEPA methods 8021or 602 as presented in SW-846, or an equivalent method approved by the OPS. EPA method 8260 may also be appropriate, especially in cases where a waste oil tank is/was present.

All samples collected are required to be analyzed for TPH. TPH should be analyzed using USEPA methods 1664 or 8015B as presented in SW-846, or an equivalent method approved by the OPS. The following flow chart may be used to determine the appropriate analytical method based on the product type at the site.

If TPH concentrations exceed 500 ppm, and BTEX concentrations are below site cleanup goals, then a sample taken from the location where the TPH concentration was the highest must be analyzed for the priority PAHs. The priority PAHs are listed below:

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)flouranthene
- Benzo(g,h,i)perylene
- Chrysene
- Dibenzo(a,h)anthracene
- Flouranthene
- Flourene
- Indeno(1,2,3-c,d)pyrene
- Naphthalene
- Phenanthrene

- Benzo(k)fluoranthene
- Pyrene

PCS with TPH concentrations in excess of 500 mg/kg will be sent off-site for disposal. Soil will be removed until passing results (TPH below 500 ppm and PAHs are below Tier 1 Risk Based Screening Levels (RBSLs)) or regulatory approval to leave in place. If the concentrations are lower than the Tier 1 RBSLs for all completed pathways, and the TPH threshold has not been exceeded, a No Further Action Required designation will be requested.

4.5 Hazardous Waste

If visually encountered during excavation, suspect hazardous waste will be characterized and transported off-site for disposal. Because historic data and information indicates that the landfill was used for MSW, hazardous waste is not expected to be encountered.

Solid waste are considered non-hazardous unless they exhibit a hazardous "characteristic" (toxicity, reactivity, ignitability, or corrosivity), or have been specifically listed a hazardous waste by the USEPA (known as a "listed waste"). Listed wastes are specific wastes, or are mixtures or wastes derived from those listed wastes. These materials may be from nonspecific sources such as spent solvents, or may be wastes from specific sources or wastes from discarded chemical products.

If hazardous wastes are discovered at the Site, these materials will be packaged, manifested, characterized, transported, and disposed in compliance with CERCLA/RCRA and state and federal transportation regulations. All hazardous waste shipped from the Site must be packaged in accordance with 49 CFR Parts 173, 178, and 179 and 6 CCR 1007-3, Sections 262.30 through 262.33. Hazardous waste accumulations containers will be labeled as "Hazardous Waste." Regulations concerning hazardous waste containers are provided in 6 CCR 1007-3, Section 265 Subpart I. In accordance with 6 CCR 1007-3, Section 262, hazardous waste manifests must note the USEPA ID number of the generator, all transporters of the waste, and the ultimate disposal facility. Regulations require generators to test the waste, or use process knowledge of the waste, to determine oif the waste is restricted from land disposal, and certify that the wastes meet the treatment standards described in 6 CCR 1007-3, Section 268, Subpart D. RCRA permitted hazardous waste disposal facilities in the region include:

- Clean Harbors Environmental Services, Inc. – Kimball, Nebraska (308-235-4012)
- Lone Mountain Landfill – Waynoka, Oklahoma (580-697-3500)
- Clean Harbors Deer Trail, LLC – Adams County, Colorado (970-386-2293)

4.6 Underground Storage Tanks

Underground storage tanks identified during redevelopment activities will be removed in accordance with the Colorado Department of Labor and Employment and the Oil and Public Safety guidelines, found at 7 CCR 1101-14. The tank will be removed in accordance with sections 2-5-2 through 2-5-5 of the guidelines. Confirmatory soil samples for soils found around

the UST will be collected for TPH-diesel and gasoline and BTEX. The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated. At a typical UST closure site, samples must be collected from under the tanks, near the dispensers and along the dispensing lines, in areas where staining or odors are noted, and/or in areas with elevated field instrument readings. If TPH results exceed 500mg/kg, the list of 16 PAHs in the Regulations must be analyzed and compared to Tier 1 risk based screening levels. PCS with TPH concentrations in excess of 500 mg/kg will be sent off-site for disposal. Soil will be removed until passing results (TPH below 500 ppm and PAHs are below Tier 1 RBSLs) or regulatory approval to leave in place. If the concentrations are lower than the Tier 1 RBSLs for all completed pathways, and the TPH threshold has not been exceeded, a No Further Action Required designation will be requested.

4.7 Other Waste Materials

If any polychlorinated biphenyls (PCB) waste is visually identified, the waste will be tested and delivered off-site for disposal at a licensed facility. PCB waste can include the following items:

- Light Ballasts
- Transformers
- Voltage Regulators
- Circuit Breakers

Any light ballast encountered at the Site will be assumed to contain PCBs. PCB-containing wastes are regulated by the USEPA under the Toxic Substances Control Act (TSCA) under 40 CFR 761. These regulations allow persons, other than manufacturers of ballasts, to dispose of non-leaking PCB ballasts as municipal solid waste with the prior approval of the solid waste landfill. Leaking PCB ballasts are considered PCB waste and must be properly packaged for transportation according to the USEPA and DOT regulations. In accordance with USEPA regulations, leaking PCB ballasts and other PCB-containing wastes must be sent to a TSCA permitted high temperature incinerator.

The reportable quantity of PCBs is one pound under CERCLA, which has been estimated by USEPA to be equivalent to ten light ballasts. Liquids and solids containing PCBs greater than 50 ppm must be containerized, stored, and transported, and disposed of in accordance with TSCA requirements. Permitted PCB disposal facilities in the region include:

- Clean Harbors Environmental Services, Inc. – Kimball, Nebraska (308-235-4012)
- Lone Mountain Landfill – Waynoka, Oklahoma (580-697-3500)
- Clean Harbors Deer Trail, LLC – Adams County, Colorado (970-386-2293)

5.0 Draft Vapor Mitigation Plan

5.1 Historical Gas Surveys

Gas surveys have been performed during several investigations of the landfill zone and soil gas is currently monitored under the post-closure monitoring program. During these programs VOCs have not been detected at concentrations that pose a concern, and methane, a gas generated by the anaerobic decomposition of organics in trash, has been detected at low levels. The post closure monitoring program currently includes methane monitoring.

As part of the FFS investigation, fourteen (14) soil gas samples were collected in the Landfill Zone. Each of the fourteen (14) samples was analyzed for VOCs by USEPA SW846 Method 8010/8020. Results from the VOC analyses indicate that all VOCs were below detection limits in all of the soil gas samples. As part of the SRI, 11 soil gas samples were collected and analyzed for methane using ASTM Method D1946. Methane was detected in four sampling locations. The locations were in the northwestern (LF-SOI2), northeastern (LF-S05), central (LF-SG6), and south-central (LF-S09) portions of the landfill. The detections ranged from 14.5 ppmv to 81.2 ppmv at location LF-S06 (Parsons ES, 1995). These concentrations from inside the landfill limits are 600 to 3,500 times lower than the regulatory limit for landfill border.

Additional sampling for methane in landfill soil gas was conducted during the FFS. Sixteen (16) soil gas samples were collected and analyzed using ASTM Method D1946. Methane was detected in only one of the sixteen (16) soil gas samples collected during the FFS landfill gas investigation. Methane was detected at a level of 1.2 percent by volume (12,000 ppmv) in sample SG2, and was below the method detection limit (1 percent by volume) in each of the remaining fifteen (15) samples. Sample SG2 is located in the west-central portion of the landfill, approximately 150 feet east of the Westerly Creek Dam berm. This indicates that methane is present within the central portion of the landfill, but at a level four times lower than the regulatory limit for the border of the landfill. For this reason and to monitor and prevent any excessive gas accumulation near or within the culvert extension, gas vents and probes every 200 feet along the alignment of the culvert extension. The locations are staggered such that a nominal 100-foot distance is between each gas vent and probe. The probes will be used to monitor gas accumulation, if any, in the granular pipe bedding placed around the culvert and the vents will provide a preferential pathway for any accumulated gas to vent to atmosphere.

As part of the FFS, sixteen (16) soil gas samples were screened for hydrogen sulfide. Hydrogen sulfide was found to be below the instrument detection limit (1 ppm) in all samples collected as part of the FFS investigation.

Currently, soil gas is measured quarterly in twenty-seven (27) soil gas vents. Section 2.3.1 of the solid waste regulations given in 6-CCR 1007-2 require that the concentration of explosive gases shall not exceed five percent of the LEL, which is five percent by volume or 50,000 parts per million by volume in air for methane. Measurements of methane in the probes are made using an organic vapor analyzer, and if readings are over five percent, samples are required to be analyzed in the laboratory. Through the first six quarters of post closure monitoring, no readings have exceeded five percent and samples have been sent to the laboratory when readings have been between one and five percent. Laboratory results have confirmed that no methane has been detected at concentrations greater than five percent of the LEL.

5.2 Conceptual Mitigation Approaches

Although sampling results indicate that methane levels are low within the landfill zone, it is possible that methane could become explosive if it builds up in unventilated spaces. Therefore, Lowry Vista will address this risk through the development of a Vapor Mitigation Plan. The plan will generally address mitigation of the potential gas buildup in new buildings, impermeable surfaces and utility corridors and health and safety during the construction at the site.

The plan will incorporate the following elements, as necessary, and will be submitted to CDPHE for approval:

- Site background and estimation of flux and concentration of soil gas emissions;
- Development plan with respect to location of waste materials;
- ARARs analysis for the potential emissions;
- Goals for indoor air, confined space and air emissions;
- Flow rate extraction goals;
- Mitigation measures for various types of structures, facilities and surfaces describing, as necessary,
    - Gravel layer
    - Subsurface gas collection pipes
    - Barrier system
    - Vent risers
    - Mechanical extraction devices
    - Pressure sensors and detectors, including action levels and response plan
    - Alarm systems
- Utility system gas controls and access safety controls, including design criteria as necessary for:
    - Utility trench venting
    - Trench dams
    - Wiring
    - Grounding electrical systems
    - Requirements for manholes and enclosures meant for personnel entry
- Landfill gas mitigation system Operations and Maintenance Plan including:
    - Overview of the mitigation systems
    - Inspection procedures, schedule and checklist
    - Monitoring procedures, schedule and checklist
    - System review schedule
    - Data collection, documentation and reporting
    - Contingency Plan
    - Health and Safety Plan
    - Building/system specific manual development

6.0 Draft Long-term Monitoring Program

A long-term operations and monitoring program currently exists for OU2. Activities under the approved Phase 2 CAP O&M plan have been occurring for the last 1.5 years of the thirty (30) year plan. A schedule of the O&M elements are provided in Appendix E. Elements of the O&M plan include:

- Inspections for subsidence areas and cracking;
- Inspections for burrowing animals;
- Surface water control inspections;
- Vegetation cover inspections;
- Inspections of the culvert extension;
- Inspections of the fences, gates and signage;
- Inspections of the gas probes/vents;
- Groundwater monitoring;
- Surface water monitoring; and
- Soil gas monitoring.

IRGI will revise this O&M Plan in accordance with Colorado statutes and regulations.

7.0 Regulatory Plan

IRGI is assessing the complex regulatory status of this proposed redevelopment, as it will need to be discussed in the context of the CERCLA section 120(h) obligations of the U.S. Air Force, the current RCRA Orders associated with the property, and the current environmental privatization of the long-term obligations associated with Operable Unit 2.

Current Regulatory Status and Financial Assurance

The OU2 Landfill Zone was originally addressed by the U.S. Air Force under it delegated authority under CERCLA. As noted in previous sections of this plan, the Landfill Zone was historically used to dispose of base-wide waste from Lowry Air Force Base. Waste disposal at the site has been estimated to have occurred from approximately 1948 until 1988. Because waste disposal ceased before the effective date of October 9, 1991 for closure under the current Subtitle D regulations, the 1983 CDPHE closure regulations were applicable to the closure of the Landfill Zone.

In 2002, the U.S. Air Force privatized the environmental services associated with the OU2 Landfill Zone, which primarily addressed the design and closure of implementation of the remedial plan chosen by the 1998 Proposed Plan. The privatization was supported by a number of agreements among CDPHE, the U.S. Air Force, LRA and LAC. The Colorado Department of Public Health and Environment, LRA, and LAC entered into a Consent Agreement, which sets the manner in which LAC and the LRA will fulfill the remediation obligations of the U.S. Air Force. The Consent Agreement is authorized in accordance with the Department's authority

under section 25-15-308(2), C.R.S. of the Colorado Hazardous Waste Act, sections 25-15-301 to 327, C.R.S., and the Colorado Hazardous Waste Regulations, 6 CCR 1007-3.

In order to support the LRA's and LAC's obligations, the U.S. Air Force and LRA entered into an Environmental Services Cooperative Agreement, which provided for the funding from the U.S. Air Force to LRA, which will be utilized by LAC in part for the remediation and long-term obligations associated with the Landfill Zone. In addition, the U.S. Air Force and the Department executed an Enforceable Agreement, which provides the assurances pursuant to Colorado Executive Order D-013-98 and Joint Policy and Department of Defense early transfer guidance. This Enforceable Agreement sets forth the U.S. Air Force's commitment to ensure that all remedial action necessary to protect human health and the environment with respect to certain parcels of property will be taken. The U.S. Air Force's obligations under this Agreement are separate and in addition to its obligations under the two final Orders issued directly to the U.S. Air Force for Lowry, Compliance Order 03-05-09-01 and Compliance Order 04-03-24-01.

In 2004, LAC implemented the closure and post-closure activities associated with OU2 subject to its Consent Agreement with the Department. In September 2006, LAC received approval on the completion of the construction of the current cap, and is currently responsible for the post-closure monitoring associated with the Landfill Zone pursuant to this Agreement. Financial assurance for the current closure is secured by LAC through two environmental insurance policies issued by AIG. Both of these insurance policies exclude the change of use contemplated by IRGI for its mixed-use community.

In 2005, the U.S. Air Force proposed conveying the remaining U.S. Air Force owned property at Lowry to the Lowry Economic Redevelopment Authority, whether or not remedial activities were completed. The U.S. Air Force submitted a Finding of Suitability for Early Transfer (FOSET) pursuant to Section 120 (h)(3)(C)[i] of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, the State of Colorado Executive Order D-013-98 and Joint Policy, and Department of Defense early transfer guidance, in support of the transfer of the parcels where all remedial actions were not complete, which included OU2. The FOSET was approved by the Governor of the State of Colorado in December 2005, which included use restrictions by deed and under the State Environmental Covenant Statute.

[i] Transfers pursuant to CERCLA Section 120(h)(3)(C) entitled "Deferral" are commonly referred to as "Early Transfers." Section 120(h)(3)(C) allows the Governor of the State, in the case of a facility not listed on the United States Environmental Protection Agency ("EPA") National Priorities List, to defer the requirement that the United States provide a covenant in the deed conveying the property. This covenant will warrant that all remedial action necessary to protect human health and the environment has been taken before the date of transfer. The United States will provide the warranty when all the response actions necessary to protect human health and the environment have been taken. The period between the transfer of title and the making of this final warranty is known as the "deferral period."

Proposed Regulatory Structure and Financial Assurance

Due to the nature of the environmental privatization and property transfer, IRGI acknowledges and understands that this Revised Closure Plan is only one document within a complex regulatory structure that will need to be reviewed and approved prior to any development of Lowry Vista. The deed restrictions by the U.S. Air Force and the State Environmental Covenant provide a process for the Owner (or Grantee) to seek modification of the current restrictions so long as the modifications meet federal and state regulations and statutes, and are protective of human health and the environment.

In addition to these modifications, there will need to be further discussion of the impact of these modifications upon the current privatization documents identified above. IRGI envisions that amendments will need to be made to these documents to clearly define each of the various parties' roles with respect to their obligations for OU2 in light of these modifications, and the need for other new documents to address the long-term liability and financial assurance concerns of the U.S. Air Force and the State of Colorado.

In the 60% document, IRGI would envision that the various stakeholders would be working on draft amendments and/or appropriate documents for review and comment. In the meantime, IRGI would invite a separate conversation with each stakeholder to the privatization on these modifications and the impact of these modifications upon the current privatization documents.

Appendix A – General Development Plan

Appendix B – Permits

Appendix C - LAC Health and Safety Plan

Appendix D – Draft Materials Management Plan

Appendix E – Operations, Maintenance and Monitoring Plan

Figure 1 – Site Location Map

Figure 2 – Trench Drawing Locations

Figure 3 – Parsons Engineering Trench Drawing Locations

Figure 4 – Air Force Trench Drawing Locations

Figure 5 – Development Plan

Figure 6 – Conceptual Cut and Fill Map

ACRONYM LIST

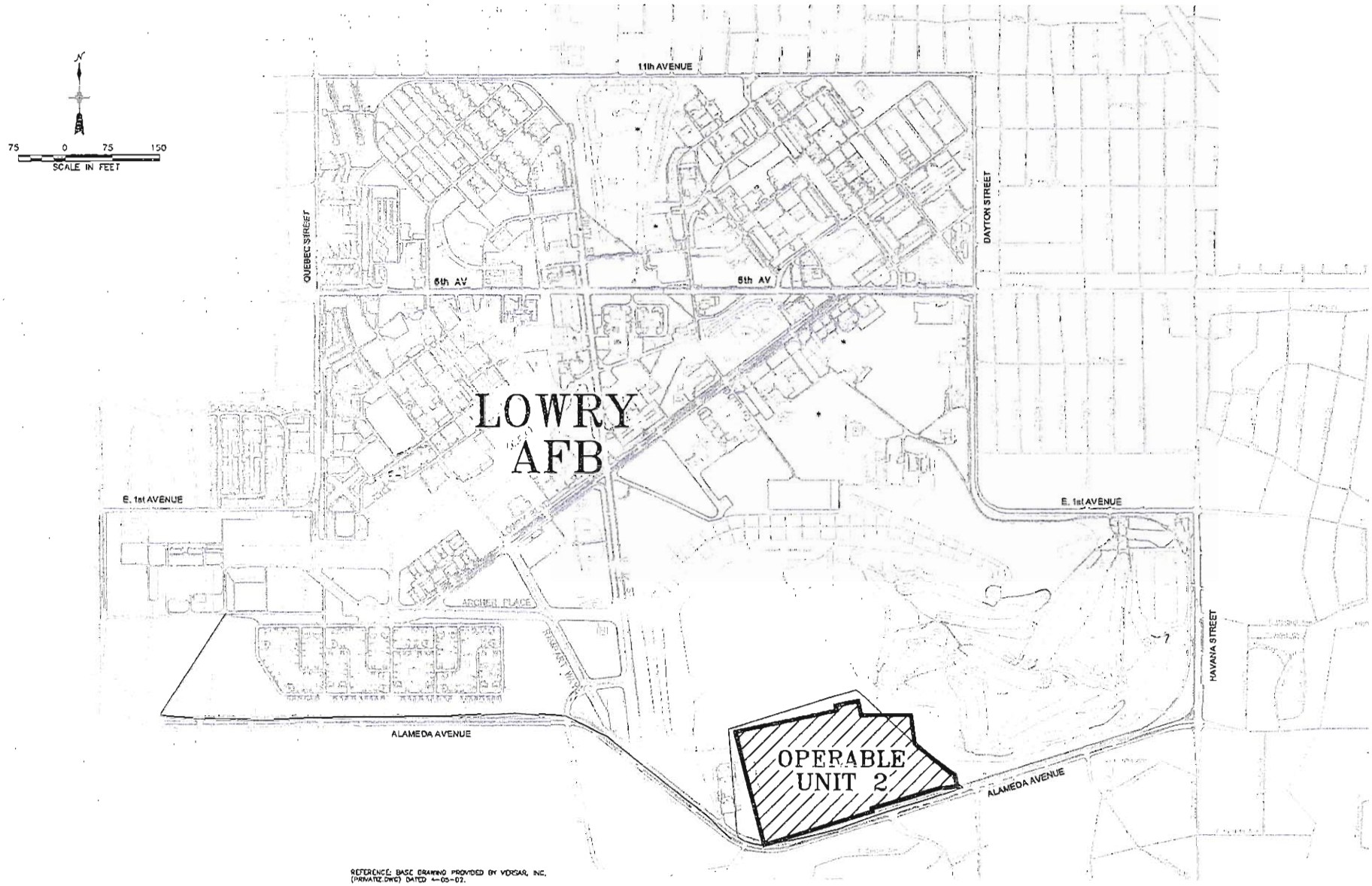
ARARs – Applicable or relevant and appropriate requirements
ASTM – American Society for Testing and Materials
BTEX –
CCR – Colorado Code of Regulations
CDPHE – Colorado Department of Public Health and Environment
CERCLA -
Department - Colorado Department of Public Health and Environment
FFS – Focused Feasibility Study
FOSET – Finding of Suitability for Early Transfer
GPS – Global positioning system
HMWMD – CDPHE Hazardous Materials Waste Management Division
IDW – Investigation-derived Waste
IRGI – IRG Redevelopment I, LLC
IRP – Installation Restoration Program
LAC – Lowry Assumption, LLC
LEL – Lower explosive limit
Lowry – Lowry Air Force Base
LPL – Low permeability layer
LRA – Lowry Economic Redevelopment Authority
MCLs – Maximum contaminant levels
MMP – Draft Materials Management Plan
MSW – Municipal Solid Waste
O&M – Operations & Maintenance Plan
OPS – Division of Oil and Public Safety
OU2 – Operable Unit 2
PAHs –
PBCs – Polychlorinated biphenyls
PCE – Tetrachloroethene
pCi/L – picocuries per liter
PCS – Petroleum contaminated soils
Phase 2 CAP – Phase 2 Corrective Action Plan
PID – Photoionization detector
ppm – parts per million
ppmv – parts per million by volume
Proposed Plan – May 1998 Proposed Plan
RAOs – Remedial Action Objectives
RBSLs – Risk bases screening levels
RFA – RCRA Facilities Assessment
RI – Remedial Investigation
Site – Operable Unit 2 Landfill Zone
SRI – Supplemental Remedial Investigation
TCE - Trichloroethene

TPH – Total petroleum hydrocarbons
TSCA – Toxic Substance Control Act
UPL – Upper prediction limit
USEPA – Environmental Protection Agency
VOCs – Volatile organic compounds

FIGURE 1

SITE LOCATION MAP

4664\4664030001\graphics\020 11/03/03 cwc



REFERENCE: BASE DRAWING PROVIDED BY VERSAR, INC. (PRIVATIZ.DWG) DATED 4-05-02.

MACTEC

Site Location
OU2 Corrective Action Plan

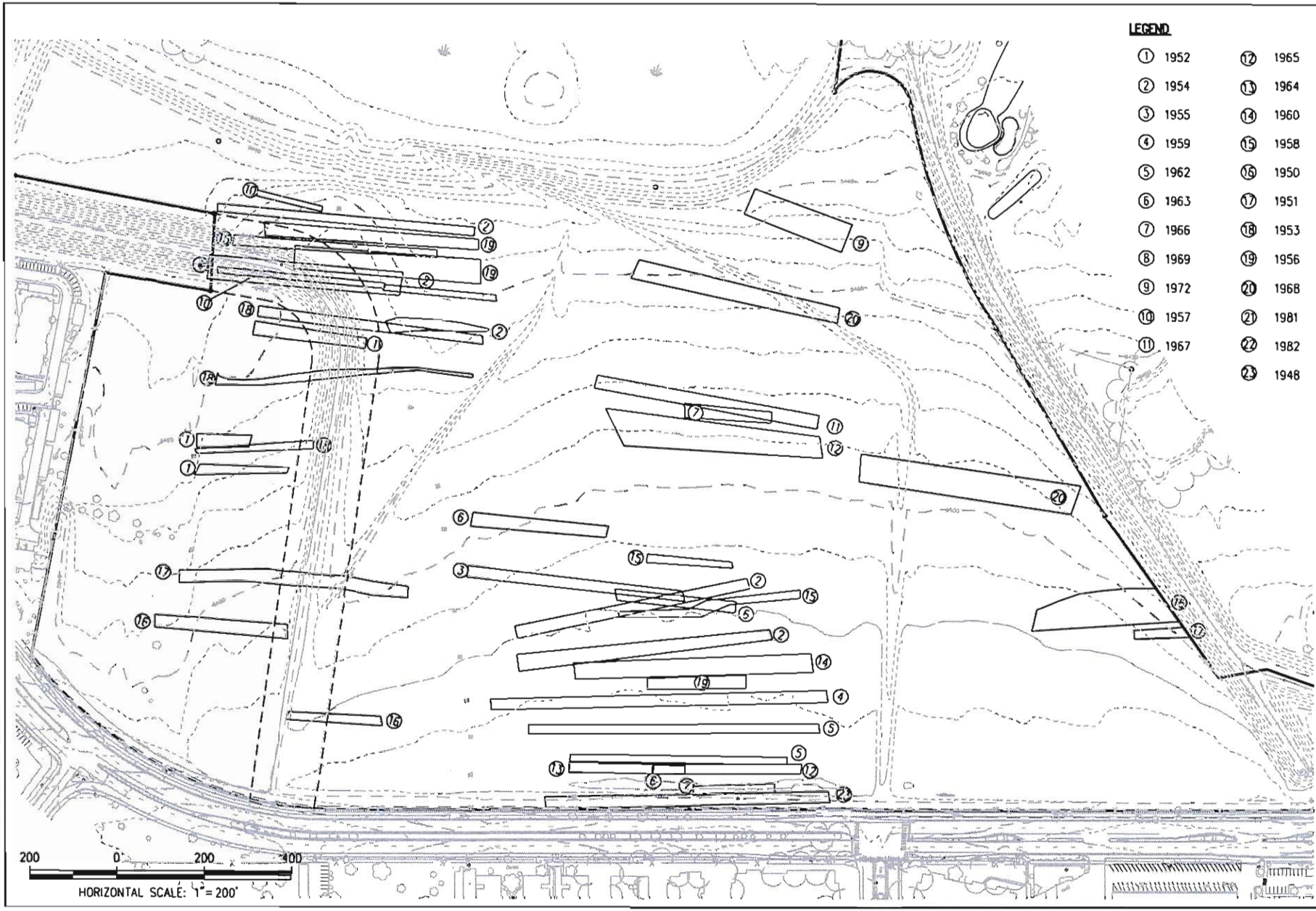
Former Lowry Air Force Base
Denver, Colorado

FIGURE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CWC	4664030001		05/03	11/03

FIGURE 2

TRENCH DRAWING LOCATIONS



NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH

DRAWING: P:\070602\LD3-070602\DWG\EXHIBIT\EX TRENCH.DWG LAYOUT: TRENCH 200 SCALE
NAME: PLOTTED: TUE 03/25/08 2:29:09P BY: CHORGANDO

HARRIS KOCHER SMITH
1391 Speer Blvd., Suite 800
Denver, Colorado 80204
Phone (303) 623-5300
Fax (303) 623-5311

NO.	REVISIONS DESCRIPTION	DATE

LOWRY VISTA, LLC

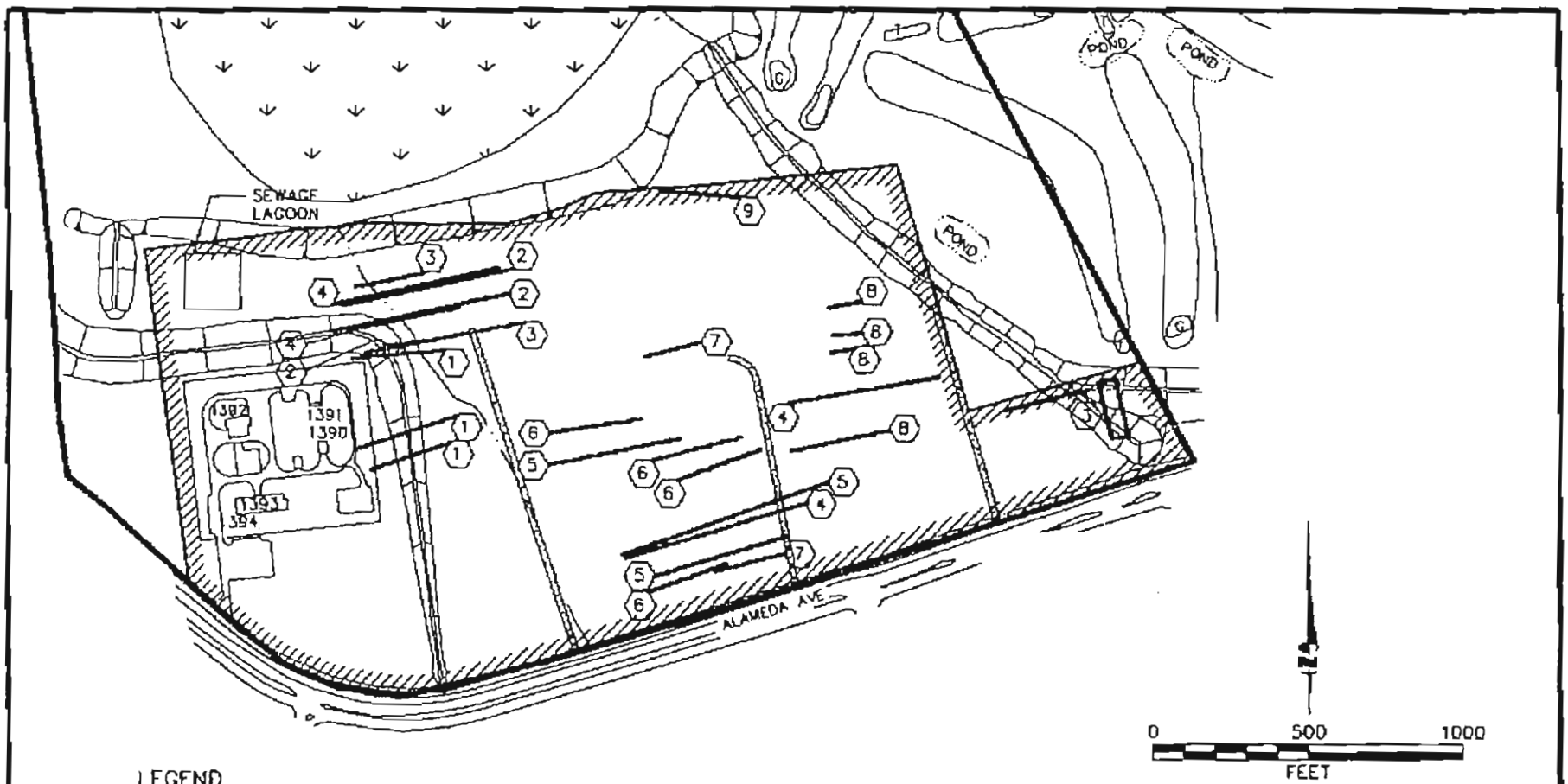
LOWRY VISTA
TRENCH EXHIBIT

DATE: 03-24-08
DRAWN: BM
CHECKED: BT
JOB NO. M888

SHEET NO.
1
OF

FIGURE 3

PARSONS ENGINEERING TRENCH DRAWING LOCATIONS



LEGEND

- SRI STUDY AREA
- LAND DISTURBANCE*
- ROADS*
- TRENCHES*
- * FEATURE DERIVED FROM AERIAL PHOTOGRAPH
- FLOOD CONTROL BERM
- FLOOD CONTROL DRAINAGE
- EMBANKMENT

YEAR OF AERIAL PHOTO:

(1) 1952	(6) 1963
(2) 1954	(7) 1966
(3) 1955	(8) 1969
(4) 1959	(9) 1972
(5) 1962	

FIGURE 1.7

AERIAL PHOTOGRAPH INTERPRETATION (1952 THROUGH 1972) LANDFILL ZONE

Supplemental Remedial Investigation/ Feasibility Study
Lowry Air Force Base, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

289 127

FIGURE 4

AIR FORCE TRENCH DRAWING LOCATIONS

400 237

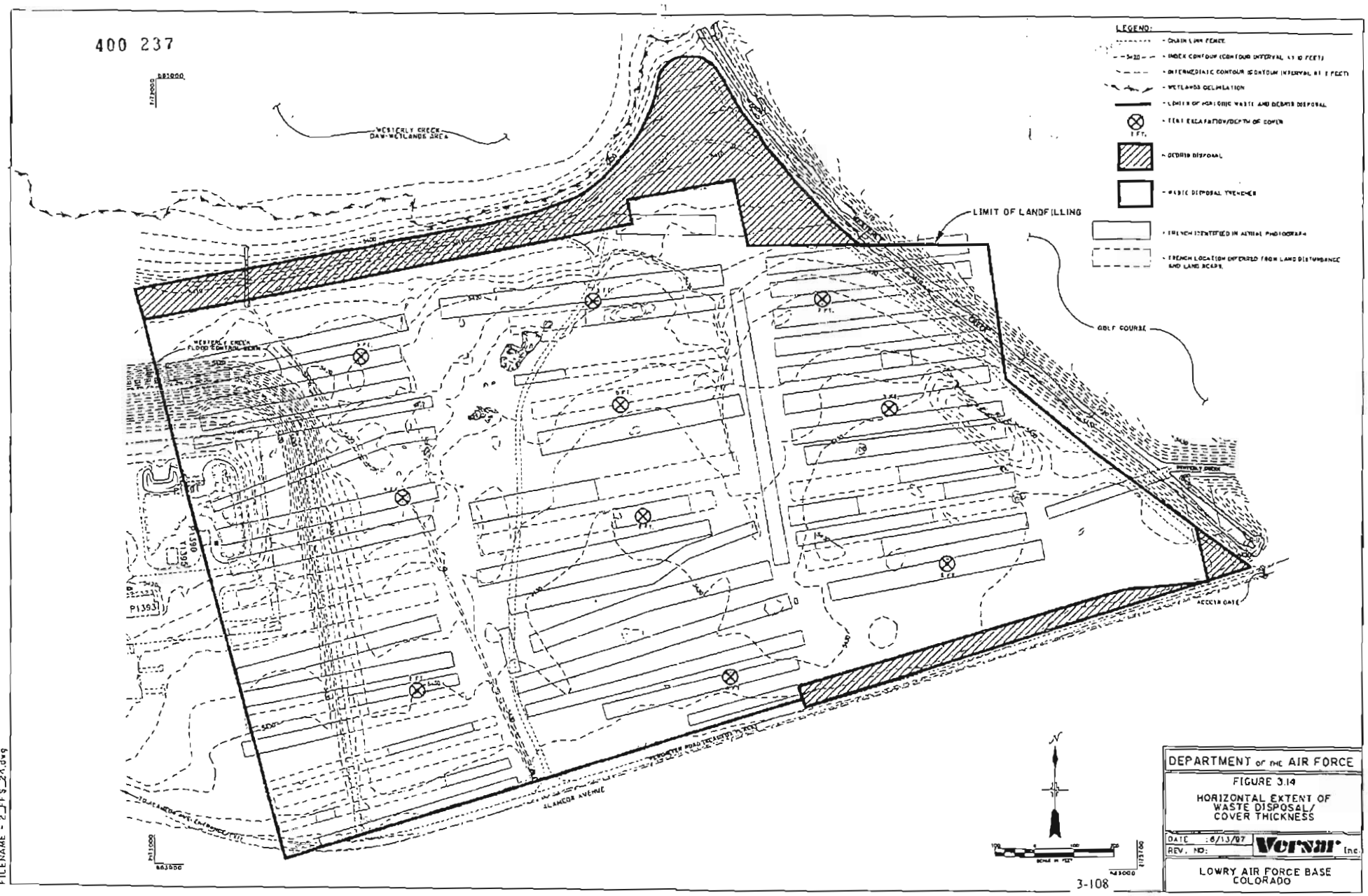


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FIGURE 5

DEVELOPMENT PLAN

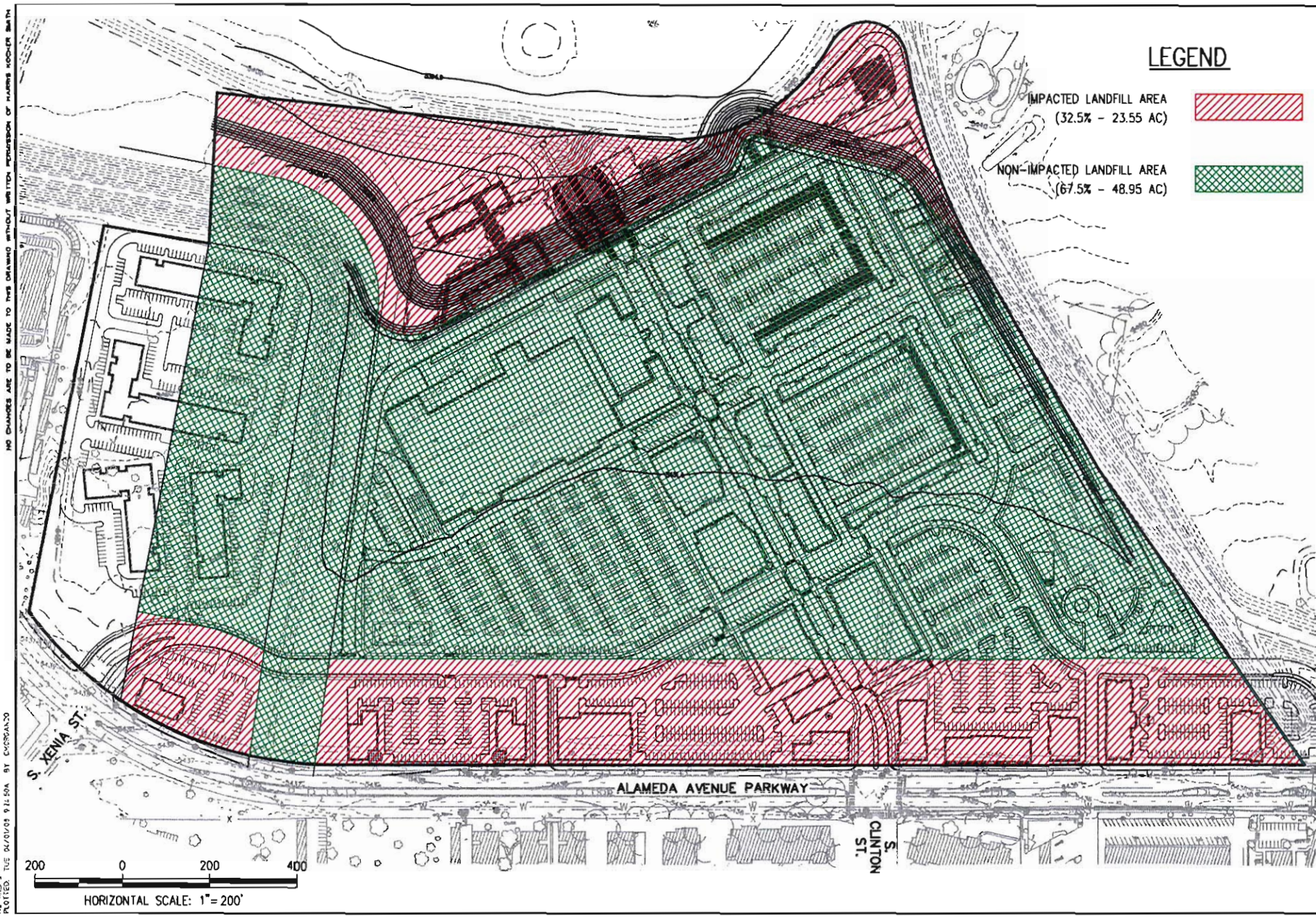
Lowry

Site Plan

Bear Creek Capital I IRG I SEM I Davis Partnership

FIGURE 6

CONCEPTUAL CUT AND FILL MAP



HARRIS KOCHER SMITH

LOWRY VISTA, LLC.

LOWRY VISTA

SHEET NO. 01

1 OF 1

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH

DRAWING NO. X85S
PLOTTED: TUE 04/01/03 9:12:50A BY CMCGRAN30
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APPENDIX A

GENERAL DEVELOPMENT PLAN

LOWRY VISTA

LOWRY VISTA GENERAL DEVELOPMENT PLAN, PROJECT 2007-0483, INTERSECTION OF EAST ALAMEDA AVENUE AT XENIA STREET, CLINTON AND DAYTON STREET
LOCATED IN THE SE QRTR OF SECT 9, SW QRTR OF SECT 10, NW QRTR OF SECT 15, NE QRTR OF SECT 16, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDAN, CITY AND COUNTY OF DENVER, STATE OF COLORADO

APPROXIMATE PROJECT STATISTICS (PRIMARY GDP AREA):

Total GDP Gross Area	3,490,178 SF/80.12 Acres
Private Street Roadway	380,375.88 SF/8.73 Acres
Total Estimated GDP Net Area	3,109,802.12 SF/71.4 Acres
GDP Net Area west of dam (R-2-A only)	468,076 sf/10.75 AC
GDP Net Area east of dam (including dam)	3,021,870 sf/69.38 AC
Aggregated Open Space Provided east of dam	348,480 SF/8.00 Acres
Buildout (Estimate 0-10 YRS)	10 years
Dwelling Units east of dam (Estimate)	up to 950
Dwelling Units R-2-A Zone (Estimate)	up to 247 per Ord. No. 604
Retail (Estimate)	up to 450,000 gsf
Office (Estimate)	up to 120,000 gsf
Hotel (Estimate)	up to 75,000 gsf
Density range (Floor Area Ratio - FAR)	up to .85 FAR
Density Range east of dam (DU/Acre)	13 du/acre
Density Range in R-2-A (DU/Acre)	23 du/acre per Ord. No. 604

CONTEXT MAP
1" = 2000'

VICINITY MAP
1" = 1000'

APPLICANTS' SIGNATURE:

PRIMARY GDP AREA

I, the undersigned, shall comply with all regulations contained in Chapter 59, Article VII, Sections 59-616 through 59-623 of the Revised Municipal Code of the City and County of Denver.
The following signature constitutes all owners of land and structures included in the Primary GDP AREA.

BY_____DATE_____
BRENT ANDERSON, PRESIDENT
IRG REDEVELOPMENT I, LLC

State of Colorado
City and County of Denver

The foregoing instrument was acknowledged before me this ___ day of _____ AD 2008 by _____.

Witness my hand and official seal
My commission expires: _____

_____
Notary Public

_____
Address

SURVEY CERTIFICATE:

I, MARK T. WILSON, a Registered Land Surveyor in the State of Colorado, do hereby certify that the legal description for the Colorado Station Primary GDP Area on page 3 hereof was made under my supervision and that it accurately and properly describes the boundary of the Primary GDP Area.

_____
MARK T. WILSON P.L.S. #16062

APPROVALS:

APPROVED BY: _____ DATE: _____
Zoning Administrator

APPROVED BY: _____ DATE: _____
Manager of Community Planning and Development

APPROVED BY: _____ DATE: _____
Manager of Public Works

APPROVED BY: _____ DATE: _____
Manager of Parks and Recreation

APPROVED BY: _____ DATE: _____
Planning Board Chair

CLERK & RECORDER'S CERTIFICATION:

STATE OF COLORADO, CITY AND COUNTY OF DENVER

I HEREBY, CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN MY OFFICE AT _____ O'CLOCK ___, M. 20___ RECEPTION # _____.

_____
Clerk and Recorder, Ex-Officio Clerk of the City and County of Denver

BY: _____
Deputy Clerk and Recorder

FEE: _____

SHEET INDEX:

SHEET 1 COVER
SHEET 2 GENERAL NOTES
SHEET 3 LEGAL DESCRIPTION
SHEET 4 EXISTING CONDITIONS
SHEET 5A DEVELOPMENT CONCEPTS
SHEET 5B DEVELOPMENT CONCEPTS CONTINUED
SHEET 6A TRANSPORTATION/CIRCULATION: VEHICULAR
SHEET 6B TRANSPORTATION/CIRCULATION: BICYCLE & PEDESTRIAN
SHEET 7 STREET CROSS SECTIONS
SHEET 8A OPEN SPACE CONCEPTS
SHEET 8B OPEN SPACE CONCEPTS CONTINUED
SHEET 9 STORM WATER CONVEYANCE AND DETENTION
SHEET 10 SANITARY AND WATER
SHEET 11 PHASING PLAN

DAVIS PARTNERSHIP ARCHITECTS

NO.	DATE	REVISIONS	DWN	CKD	APPRD

PROJECTING
STAGE 0
DATE 05.02.08
SHEET NUMBER
1 of 14

COVER SHEET

LOWRY VISTA

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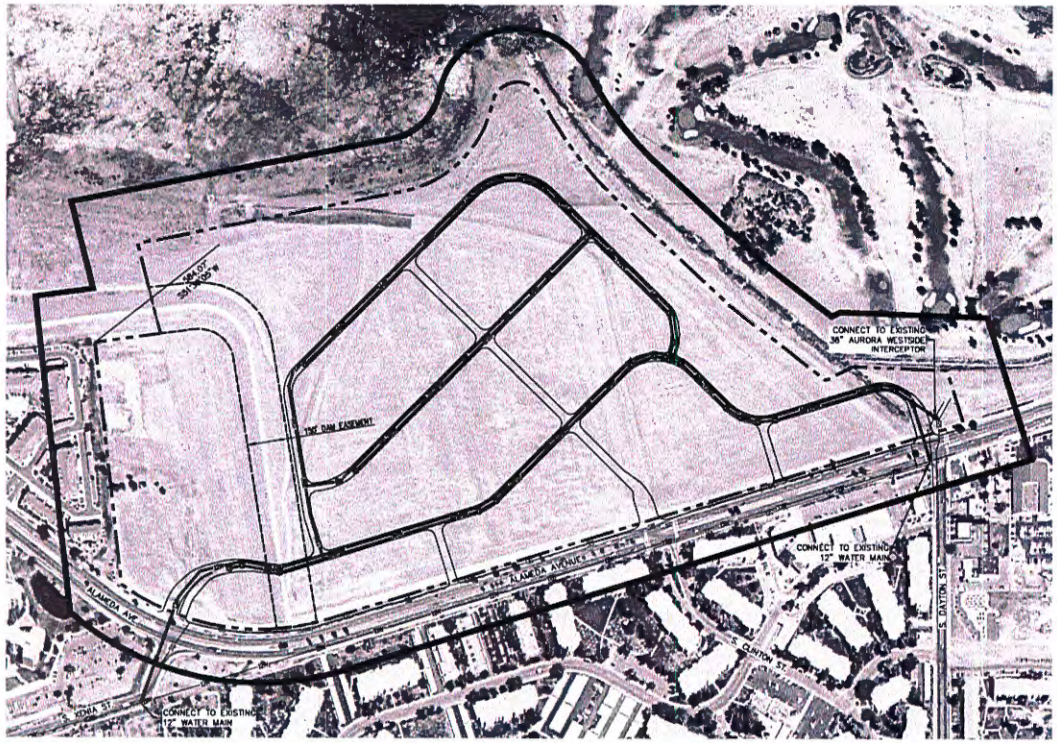

SANITARY AND WATER

SANITARY SEWER

THE PROPOSED SANITARY SEWER SYSTEM FOR LOWRY VISTA WILL DISCHARGE TO THE EXISTING 36" AURORA WESTSIDE INTERCEPTOR NEAR ALAMEDA AVE. & S. DAYTON ST.

WATER

THE PROPOSED WATER SYSTEM FOR LOWRY VISTA WILL MAKE A COMPLETE LOOP, WITH CONNECTIONS TO THE EXISTING 12" WATER MAIN THAT RUNS ADJACENT TO ALAMEDA AVENUE NEAR ALAMEDA AVE. & S. XENIA ST., AND ALAMEDA AVE. & S. DAYTON ST.

NOTES

1. ALL PROPOSED UTILITIES SHOWN ARE CONCEPTUAL AND ARE SUBJECT TO CHANGE WITH REVISIONS OF THE SITE PLAN
2. THE WATER SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH DENVER WATER STANDARDS.
3. THE SANITARY SEWER SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH DENVER WASTEWATER STANDARDS.

LEGEND

- GDP BOUNDARY
- OWNERSHIP BOUNDARY
- DAM EASEMENT
- PROPOSED WATER MAIN
- EXISTING WATER MAIN
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER

NOTE
THIS SKETCH IS NOT A MONUMENT BOUNDARY SURVEY, IMPROVEMENT SURVEY OR LAND TITLE SURVEY. IT IS INTENDED ONLY TO BE A MAP SHOWING THE SELECTED PROPERTY INFORMATION OBTAINED FROM SEPARATE CERTIFIED SURVEYS

SANITARY AND WATER
1" = 200'
N

HARRIS KOCHER SMITH
engineers and surveyors
1391 Speer Blvd., Suite 500
Denver, Colorado 80204
Phone (303) 623-6300
Fax (303) 623-6311

DAVIS PARTNERSHIP ARCHITECTS

DATE	NO	REVISIONS	DRWN	CHKD	APPD

PROJECT NO
DRAW NO
DATE 05.02.08
SHEET NUMBER

SANITARY AND WATER

GDP

LOWRY VISTA

LOWRY VISTA GENERAL DEVELOPMENT PLAN, PROJECT 2007-0483, INTERSECTION OF EAST ALAMEDA AVENUE AT XENIA STREET, CLINTON AND DAYTON STREET
LOCATED IN THE SE QRTR OF SECT 9, SW QRTR OF SECT 10, NW QRTR OF SECT 15, NE QRTR OF SECT 16, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDAN, CITY AND COUNTY OF DENVER, STATE OF COLORADO

GENERAL NOTES

VESTED PROPERTY RIGHTS

Section 59-314 (a) of the Denver Revised Municipal Code states as follows:
An approved GDP shall constitute a site specific development plan which triggers a vested property right pursuant to CRS-24-68-102(4). Such property right which has been vested shall remain vested for a period of three (3) years. The applicants vested rights are directly proportional to the level of detail approved in the general development plan. The applicant obtains vested rights only to the extent that the GDP specifically includes development program, architecture and engineering solutions and those solutions are specifically approved. The recorded GDP is binding upon the applicants, their successors and assigns and approving city review committee agencies. The implementation and phasing plan is not a self-implementing document and is used for strategic timing only. It neither confirms nor denies any property rights or public funding.

Due to the complexity and timing of the project build out, which presently estimated to be between 2 to 10 years, the vesting period for this GDP is extended from three (3) to ten (10) years. Pursuant to Section 59-314 (a) above, the sections of this GDP that shall be vested property rights for ten (10) years shall include the following:

- A. Sheet 5B
  Development Concept (Preliminary Land Use Breakdown)
- B. Sheet 6A
  Vehicular Circulation
- C. Sheet 7
  Street Sections
- E. Sheet 8A & 8B
  Open Space Definition
  Aggregated Open Space
  - -Public Plazas
  - -Traditional Public Park
  - -Pocket Parks along Trail System
  - -Natural Area
  - -Dam Easement Trail and Trailhead
- F. Sheet 9
  Storm Drainage Notes

Public Benefit
The Lowry Vista project will provide many public benefits to both the surrounding community and City and County of Denver (CCD). Some of these benefits include the following:

- Project will bring useable amenities that will be open to the public verses the closed fenced off site currently existing.
- Project will bring significant tax base to the City and County of Denver.
- Project will provide publicly accessible open space.

Affordable Housing
The Lowry Vista Project is subject to, and will follow, the provisions of the Lowry Redevelopment Authorities' Affordable Housing program.

GDP AMENDMENTS

The determination by the Zoning Administrator under Section 59-314 (f)(5) of the Zoning Code as to whether a proposed amendment to this GDP is a major or minor amendment shall be based on the following clarifications to the criteria set forth in Section 59-314(f)(5) (a):

1. This GDP is a framework only and does not specifically allocate building heights, mix of uses or density of the development. Changes to these items will not require any amendments, major or minor to the GDP.
2. No land is being dedicated on this GDP to parks, trails, open space, natural areas or public facilities.

OPEN SPACE OWNERSHIP AND MAINTENANCE

The Developer will be responsible for development of all related infrastructure for this site, and will be responsible for maintenance and operations of all open spaces through a homeowner association, property association, or district.

APPROXIMATE PROJECT STATISTICS (PRIMARY GDP AREA):

Total GDP Gross Area	3,490,178 sf/80.12 AC
Private Street Roadway (Estimate) -	380,375.88 sf/8.73 AC
Total Estimated GDP NET Area	3,109,802.12 sf/71.4 AC
GDP Net Area West of Dam (R-2-A only)	468,078 sf/10.75 AC
GDP Net Area East of Dam (including dam)	3,021,870 sf/69.38 AC
Aggregated Open Space Provided East of Dam	3,021,870 sf/8.0 AC
Buildout (Estimate Four Phases)	10 years
Dwelling Units east of dam (Estimate)	up to 950
Dwelling Units West of Dam (R-2-A)	up to 247 per Ord. No. 604
Retail (Estimate)	up to 450,000 gsf
Office (Estimate)	up to 120,000 gsf
Hotel (Estimate)	75,000 sf/up to 250 rooms
Density Range east of dam (Floor Area Ratio - FAR)	up to 0.85 FAR
Density Range east of dam (DU/Acre)	up to 13 du/ac
Density Range (DU/Acre) R-2-A per Ord. No. 604	up to 23 du/ac

Aggregate Open Space Breakdown By Area (ESTIMATE)	
Main Streetscape	not included in calcs.
Public Plazas	0.90 AC
Traditional Public Park	0.50 AC
Pocket Parks along Trail System	0.30 AC
Natural Area	4.80 AC
Dam Easement Trail and Trailhead	1.50 AC
Total Aggregated Open Space Required east of dam	(10%)
Total Aggregated Open Space Provided east of dam	(11.5%)348,480 sf/8.00 AC
Residential R-2-A Open Space	follow DMC Sec. 59-120 (4)

GENERAL NOTES

Introduction and Purpose

Intent of the General Development Plan
The General Development Plan (GDP) is a required document within the Mixed-Use Zone District. It is an overview plan designed to establish the framework for development that combines infrastructure and anticipated land use within the surrounding fabric of the City. It is intended to be a guidance document used as a master plan for the development of the phased project. The term "Lowry Vista" shall refer to all property within the boundaries defined for this document (see sheet 3).

Approval of the GDP will constitute approval of the master plan and will guide all future development within the area defined by the GDP.

The adjacency of Lowry Vista to the natural drainage area and the history of a landfill site provides a unique setting for this development. We are inspired to establish a design concept and ultimate branding of the development and to tell a "story" of recycling, nature and water resource. Lowry Vista is intending to create a specific image while incorporating the Denver tradition and ideology of how the redevelopment will relate to the existing Lowry Community, which is important to the identity and livability of the development while still maintaining its distinctiveness.

Land Use
The Land Use Plan for Lowry Vista, described on Page 5A, is based on principles and land uses established and refined by the master developer (IRC Redevelopment I, LLC) to better address market opportunities. The land use plan will be consistent with what is allowed in the proposed zones for the project. Based on this plan, the following mix of development and open space is planned for the Lowry Vista development:

Implementation
Following approval of this GDP, the subject property will go through the following process:

1. Rezoning
2. Platting
3. Site Plan Approval
4. Building Permits

Zoning
Concurrently with this GDP, this site will be zoned to include the mixed uses and aggregated open spaces planned for this development. Development in these districts will be based on market opportunities. It is the intent that Lowry Vista be rezoned as depicted as a mixed use site. The rezoning will occur prior to the development of phase one shown on the Phasing Exhibit on Sheet 14. The rezone of this property is proposed to be C-MU-20 Commercial Mixed Use and R-MU- 30 Residential Mixed Use.

The existing R-2-A west of the dam will remain for the majority of the parcel.

Transportation and Major Street Network
The Lowry Vista development will extend the local roadway network to provide internal circulation and make use of existing regional and local transportation to provide site access as shown on sheet 6 of 14.

RTD bus #3 runs east west along Alameda and stops directly in front of the Lowry Vista site. A Dayton Street route to Aurora, Parker Road, Nine Mile Park-in-ride is proposed as tentative in this area as well.

Windsor Gardens, the development to the south of the project, runs a shuttle service internally to the development and to an existing neighborhood serving retail to the east. The development is in communication with Windsor Gardens to establish a connection of this shuttle to the Lowry Vista site.

Proposed Parks, Open Space, Trails and Other Public Facilities

Aggregated Parks and Open Space
It is envisioned that useable parks and open space will be provided for neighborhood and on site residences as development occurs. The open space will serve primary neighborhood needs. The character of the open space areas and neighborhood "pocket" parks will be mostly passive parks. Parks and open spaces will be considered "neighborhood greens" and will serve by definition as passive recreation/leisure spaces, usually smaller than an acre and serve residences within a ¼ mile radius.

Boulevard/Avenue
Currently the site is bordered on the south by Alameda Avenue, although classified as one of the 35 designated boulevards within the City, this distinction ends at Quebec and returns to an avenue at this projects location. The development intention is to maintain the character of boulevards with wider tree lawns with linear tree plantings and walks in front of the entire development.

Trails
Alameda Avenue is an existing designated bicycle trail adjacent to the development area which also connects to the regional High Line Canal Trail and branches off in various directions such as the Lowry Development, Cherry Creek and all over the City. Within Lowry Vista, a system of pedestrian friendly streets will be developed to circulate automobile traffic throughout the development, with pedestrian and bicycle traffic encouraged as part of the experience. An informal bicycle trail runs along the top of the dam, part of the maintenance road, to the Lowry development where there is a public park. A trailhead is proposed along the main east-west road into the development for trail users to rest and gather.

DAVIS PARTNERSHIP ARCHITECTS

DATE: 05.02.08

GENERAL NOTES

2 of 14

LOWRY VISTA GDP

LOWRY VISTA

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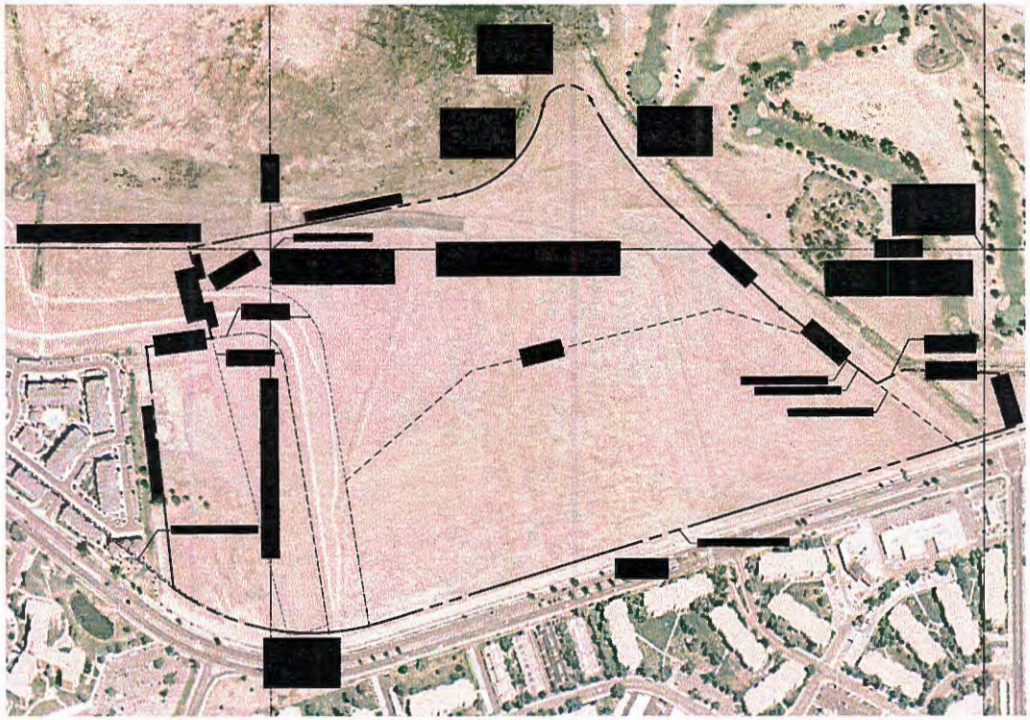

LEGEND

- PROPERTY LINE
- SET #5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP, STAMPED: URS CORP PLS 20683
- FOUND 1-1/4" YELLOW PLASTIC CAP, STAMPED: URS CORP PLS 20683

GDP AREA LEGAL DESCRIPTION
1" = 200'

DESCRIPTION OF PRIMARY GDP AREA BOUNDARY:

DESCRIPTION:

A PARCEL OF LAND BEING A PORTION OF THOSE PARCELS DESCRIBED AT RECEPTION NO. 2007130973 AND RECEPTION NO. 2006016801 OF THE RECORDS OF THE CITY AND COUNTY OF DENVER CLERK AND RECORDER, SITUATED IN THE SOUTHEAST 1/4 OF SECTION 9, THE SOUTHWEST QUARTER OF SECTION 10, THE NORTHWEST 1/4 OF SECTION 15 AND THE NORTHEAST 1/4 OF SECTION 16, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE 6TH P.M., CITY AND COUNTY OF DENVER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 15;
THENCE SOUTH 51°30'05" WEST, A DISTANCE OF 584.07 FEET TO AN ANGLE POINT ON THE WESTERLY LINE OF SAID PARCEL DESCRIBED AT RECEPTION NO. 2006016801 AND THE POINT OF BEGINNING;
THENCE ALONG THE PERIMETER OF SAID PARCEL THE FOLLOWING SIX (6) COURSES:

1) NORTH 82°13'43" EAST, A DISTANCE OF 243.59 FEET;
2) NORTH 14°07'41" WEST, A DISTANCE OF 345.98 FEET;
3) NORTH 78°47'16" EAST, A DISTANCE OF 1002.84 FEET TO A POINT OF NON-TANGENT CURVATURE;
4) ALONG THE ARC OF SAID CURVE TO THE LEFT HAVING A RADIUS OF 420.08 FEET, A CENTRAL ANGLE OF 67°12'34", AN ARC LENGTH OF 492.74 FEET AND A CHORD WHICH BEARS NORTH 44°26'58" EAST A CHORD LENGTH OF 464.97 FEET TO A POINT OF NON-TANGENT REVERSE CURVATURE;
5) ALONG THE SOUTHERLY LINE OF SAID PARCEL AND ALONG THE ARC OF SAID CURVE TO THE RIGHT HAVING A RADIUS OF 92.97 FEET, A CENTRAL ANGLE OF 144°09'24", AN ARC LENGTH OF 233.90 FEET AND A CHORD WHICH BEARS NORTH 82°51'54" EAST A CHORD LENGTH OF 176.91 FEET TO A POINT OF NON-TANGENT REVERSE CURVATURE;
6) ALONG THE WESTERLY LINE OF SAID PARCEL AND THE ARC OF SAID CURVE TO THE LEFT HAVING A RADIUS OF 1,395.92 FEET, A CENTRAL ANGLE OF 22°39'25", AN ARC LENGTH OF 552.06 FEET AND A CHORD WHICH BEARS SOUTH 37°48'58" EAST A CHORD LENGTH OF 548.41 FEET;

THENCE SOUTH 48°52'03" EAST , A DISTANCE OF 498.99 FEET TO A POINT ON THE EASTERLY LINE OF SAID PARCEL;
THENCE SOUTH 51°58'32" EAST ALONG SAID EASTERLY LINE, A DISTANCE OF 454.01 FEET;
THENCE NORTH 82°49'14" EAST, A DISTANCE OF 111.19 FEET;
THENCE SOUTH 87°52'55" EAST, A DISTANCE OF 350.61 FEET;
THENCE SOUTH 17°13'04" EAST, A DISTANCE OF 207.27 FEET TO A POINT ON THE SOUTHERLY LINE OF SAID PARCEL DESCRIBED AT RECEPTION NO. 2007130973;
THENCE SOUTH 72°47'56" WEST ALONG SAID SOUTHERLY LINE AND THE SOUTHERLY LINE OF SAID PARCEL DESCRIBED AT RECEPTION NO. 2006016801, A DISTANCE OF 2,460.31 FEET TO A POINT OF CURVATURE;
THENCE ALONG THE SOUTHERLY LINE OF SAID PARCEL DESCRIBED AT RECEPTION NO. 2006016801 AND ALONG THE ARC OF SAID CURVE TO THE RIGHT HAVING A RADIUS OF 880.29 FEET, A CENTRAL ANGLE OF 53°21'02", AN ARC LENGTH OF 801.05 FEET AND A CHORD WHICH BEARS NORTH 80°31'33" WEST A CHORD LENGTH OF 772.43 FEET;
THENCE NORTH 08°14'49" WEST ALONG THE WESTERLY LINE OF SAID PARCEL, A DISTANCE OF 902.89 FEET TO THE POINT OF BEGINNING.

CONTAINING 3,490,178 SQUARE FEET OR 80.12 ACRES, MORE OR LESS.

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, CITY AND COUNTY OF DENVER, STATE OF COLORADO, MONUMENTED BY A 3" BRASS CAP IN RANGE BOX PLS 16419 AT THE NORTHWEST CORNER OF SAID SECTION 15 AND A 3 1/4" ALUMINUM CAP PLS 20683 AT THE NORTH QUARTER CORNER OF SAID SECTION 15, AS BEARING NORTH 89°58'53" WEST.

PREPARED BY: MARK T. WILSON
PLS 36062
ON BEHALF OF: HARRIS KOCHER SMITH
1391 SPEER BLVD. SUITE 390
DENVER, CO 80204
303-623-6300

SURVEY NOTES

1. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

2. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY HARRIS KOCHER SMITH TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHT-OF-WAY AND TITLE OF RECORD, HARRIS KOCHER SMITH RELIED UPON COMMITMENT FOR TITLE INSURANCE ORDER NO. ABS70124881-6 ISSUED BY LAND TITLE GUARANTEE COMPANY AND HAVING AN EFFECTIVE DATE OF DECEMBER 29, 2005 AT 5:00 P.M.

3. BASIS OF BEARINGS: BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDIAN AS BEING SOUTH 89°58'53" EAST. THE BEARING OF SAID LINE IS SHOWN ON THE CITY AND COUNTY OF DENVER LOWRY AIR FORCE BASE BOUNDARY SURVEY UNDER PROJECT NO. 94-578, DATED 4/08/96 AND FILED IN BOOK 23 OF THE COUNTY SURVEYOR'S LAND SURVEY/RIGHT OF WAY SURVEYS AT PAGES 102-103. THE NORTH QUARTER CORNER OF SECTION 15 IS A FOUND 3-1/4" ALUMINUM CAP STAMPED: PLS 20683 AND THE NORTHWEST CORNER OF SECTION 15 IS A FOUND 3" BRASS CAP IN A CITY OF AURORA RANGE BOX STAMPED: LS 16419.

4. BENCHMARK: CITY AND COUNTY OF DENVER BENCHMARK #558A, LOCATED IN THE SOUTHEAST CORNER OF THE INTERSECTION OF ALAMEDA AVE. AND CLINTON ST. NGVD 29 ELEVATION=5434.23'

HARRIS KOCHER SMITH
engineers · land surveyors
1391 Speer Blvd., Suite 390
Denver, Colorado 80204
Phone (303) 623-6300
Fax (303) 623-6311

LEGAL DESCRIPTION

DAVIS PARTNERSHIP ARCHITECTS

DATE	BY	REVISIONS	DWG NO	APVD

PROJECT NO.
DRAWN BY
DATE 05.02.08
SHEET NUMBER 3 of 14

LOWRY VISTA

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CITY AND COUNTY OF DENVER, STATE OF COLORADO

NOTES:

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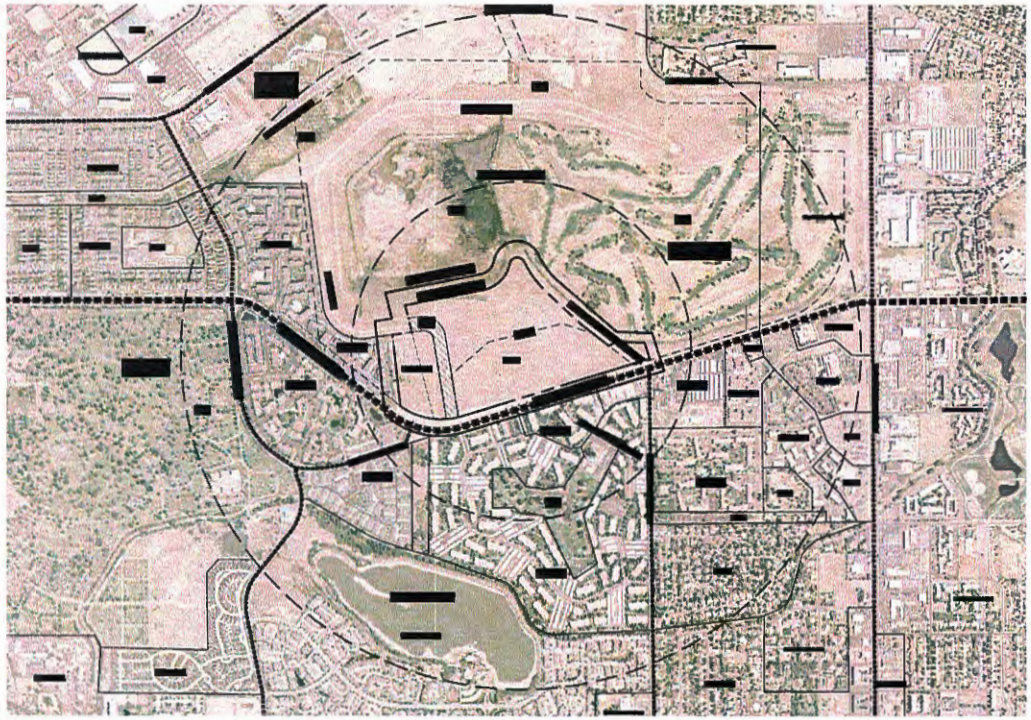
STREETS SHOWN WITHIN THE GDP BOUNDARY ARE FOR ILLUSTRATIVE PURPOSES ONLY



LEGEND

- PRIMARY GDP BOUNDARY
- PROPERTY LINE
- ¼ & ½ MILE RADII FROM TRANSIT STATION
- DAM EASEMENT
- FLOWAGE EASEMENT
- MAJOR ARTERIAL STREET
- COLLECTOR STREET
- ZONE DISTRICT BOUNDARY

EXISTING CONDITIONS
1" = 600'

GENERAL NOTES:
The Lowry Vista project is approximately 80 acres located to the south west of downtown Denver and borders the City of Aurora. Direct access to the site is from East Alameda Avenue generally between Xenia and Dayton Streets.

The Lowry Vista site is bisected by the Lowry dam which divides the site into two distinct areas; the "East Parcel" which contains approximately 69 acres and is located east of the dam and the "West Parcel" containing approximately 11 acres west of the dam, abutting the AMLI Lowry development. The site is also adjacent to the Wire Vista golf Course to the east. Across Alameda Avenue on the south is the Windsor Gardens development. North of the site and south of the Lowry dam is an existing drainage area that has been established by the creation of the dam. It is a natural attraction off site that the Lowry Vista project will take into consideration during development and be treated as an amenity.

EXISTING ZONING FOR GDP AREA:
The site is presently zoned O-1 and R-2-A. The zoning may be changed in some locations to accomplish the vision of the Lowry Vista Development. The following zone definitions are for the current existing conditions.

O-1 Open Space District: Allows airports, recreational uses, parks, cemeteries, reservoirs, community correctional facilities, and other public and semi-public uses housed in buildings. Setback requirements apply to the location of structures.

R-2-A Multi-Unit Dwellings: Reference Denver Ordinance No. 604, Council Bill No. 497 dated September 6, 1967, regarding the rezoning of this parcel and the waiver enacted by the Council of the City and County of Denver allowing a maximum of 23 dwelling units per net acre.

URBAN DESIGN STANDARDS and GUIDELINES:
The project will have Urban Design Standards and Guidelines that are an ammendment to the high standards set by the existing Design Guidelines of the Lowry Community and will be developed to facilitate the design intent of the new development.

EXISTING VIEW PRESERVATION HEIGHT LIMITATIONS:
The project is not located within and existing view preservation height limit. The development intends to allow view corridors into and past the site out of respect of the development to the south, Windsor Gardens.

HISTORIC LANDMARK DESIGNATIONS:
The project does not have any Historic Landmark Designation associated with the 80 plus acres.

EXISTING BUILDINGS AND STRUCTURES:
Currently there are no buildings on the site but the area was used as a debris landfill when it was part of Lowry Air Force Base. It was environmentally "closed" under Colorado Department of Health and Environment (CDHPE) regulations through the placement of a clay cap. The site will be developed with utmost sensitivity to this history.

EXISTING TRANSPORTATION FACILITIES:
Alameda Avenue is an existing public roadway, directly adjacent to the south property line. There are no existing transportation facilities on site.

DESIGNATED PARKWAYS and GREENWAYS:
The Lowry Vistas project's southern property edge is Alameda Avenue, a designated boulevard in the City and County of Denver west of Quebec but an arterial neighborhood avenue designation in front of the Lowry Vista project site. It is intended that access from Alameda Avenue will be lined up at existing intersections at Xenia Street, Clinton Street, and Dayton Street. There are existing traffic lights at Clinton Street and Dayton Street.

REGIONAL STORMWATER CONVEYANCE:
Overland flow from upstream watersheds is conveyed through the existing site by overland flow, and a shallow ditch that bisects the site. Westerly Creek lies directly adjacent to the site, along the eastern property line.

WATER TREATMENT PLANTS AND WATER TRUNK LINES:
There are no existing water treatment plants or water trunk lines on or adjacent to the site.

SANITARY SEWER LIFT STATIONS:
There are no existing sanitary sewer lift stations on or adjacent to the site.

REGIONAL UTILITY PLAN:
There is no known Regional Utility Plan that affects the site.

PARKS and OPEN SPACE:
The Greater Lowry Community and its park system will be accessible by trail from the Lowry Vista site, where Jackie Robinson Park is located approximately 1/2 mile from the proposed development.

RIVERS, CREEKS, DRAINAGE WAYS, and WETLANDS:
Approximately ⅔ of the site is in a flowage easement to the benefit of Urban Drainage and Flood Control District (UDFCD) for the operation and maintenance of the Westerly Creek Dam. Westerly Creek Dam bisects the eastern portion of the site, and Westerly Creek lies directly adjacent to the site, along the eastern property line. There are no known wetlands on site. There are approximately 100 acres of a natural drainage area to the north of the site that is currently owned by the Wire Vista Golf Course.

SENSITIVE HABITAT:
The site currently is a closed landfill under use restrictions over seen by Colorado Department of Health and Environment (CDHPE).

PUBLIC FACILITIES:
There are no public facilities within a 1/4 radius.

TOPOGRAPHY AND GRADE:
The site generally slopes to the north, at grades ranging from approximately 1.5% to 25%.

FLOODPLAINS:
Westerly Creek is designated as Zone A floodplain. None of the site lies within the 100 year FEMA floodplain.

DAVIS PARTNERSHIP ARCHITECTS

DATE	REV.	REMARKS	DRWN.	CHKD.	APVD.

PROJECT NO.
JOB NO.
DATE 05.02.08
SHEET NUMBER 4 of 14

EXISTING CONDITIONS

LOWRY VISTA

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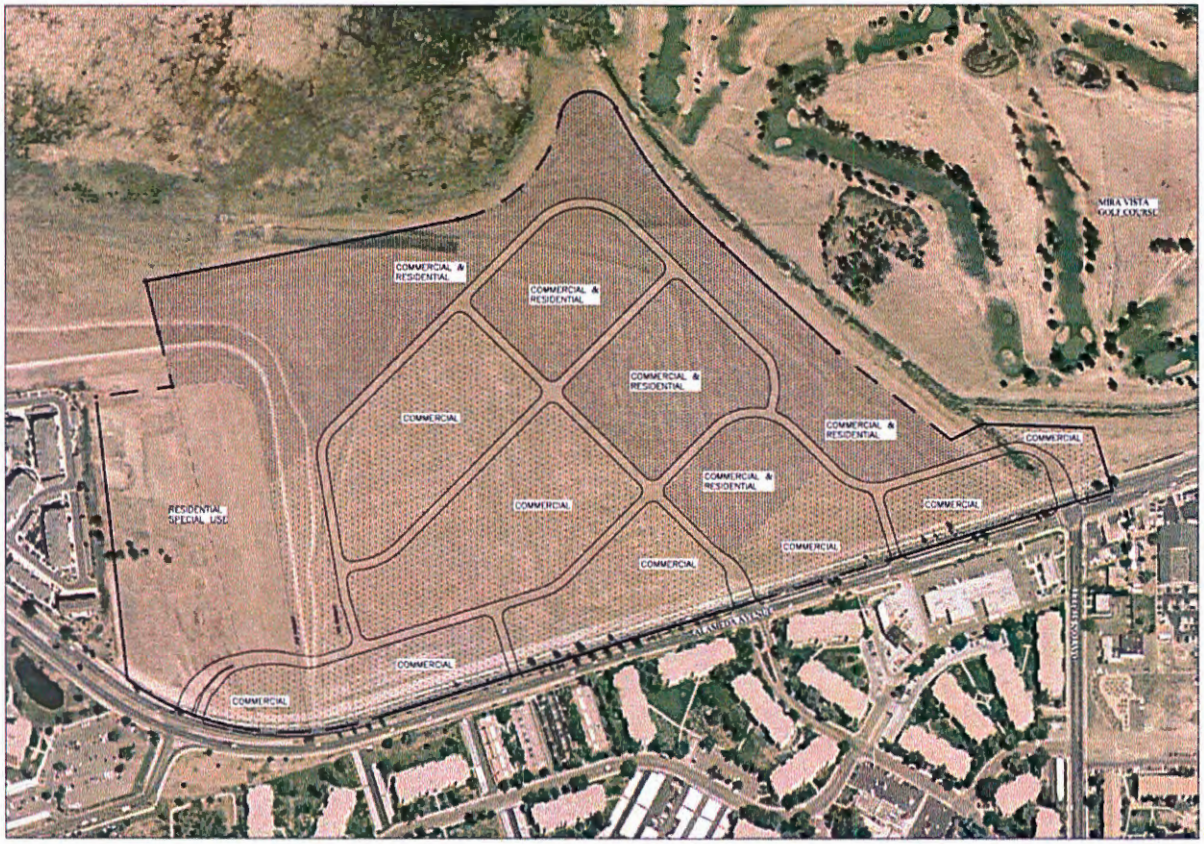

LEGEND

- PRIMARY GDP BOUNDARY
- PROPERTY LINE
- PROPOSED CURB
- COMMERCIAL (RETAIL, OFFICE, HOTEL)
- COMMERCIAL (RETAIL, OFFICE, HOTEL) AND RESIDENTIAL

DEVELOPMENT CONCEPTS N
1" = 200'

LAND USE CONCEPTS: PRIMARY GDP AREA

PRELIMINARY LAND USE SUMMARY: PRIMARY GDP AREA

General Concepts -
The development and design intent for the 80 acres that make up the Lowry Vista project is to create a new mixed-use neighborhood that welcomes people, ties to the surrounding community and encourages a variety of activities. The proposed development shall accommodate a mix of uses, such as retail, entertainment, hotel, office, and residential among other uses, integrated into a variety of outdoor piazza and landscapes. The environment should consist of walkable streets that link to active pedestrian spaces suitable for hosting a variety of events. The design concept should encourage a vibrant place with a distinctive identity that embraces the idea of sustainability, sitrata, and recycling. Lowry Vista's ultimate theme of the development is to tell the "story" of recycling disturbed land. The adjacency to a drainage area also is an inspiration to find ways to link Lowry Vista with this open space such that this area is accessible to pedestrians and is an asset to those who live, work and visit Lowry Vista. Together these conditions and have led to the landscape, urban design and architectural approaches to the development.

Lowry Vista is designed to be a flexible, phased development that can evolve and change as market conditions dictate. The proposed streets will provide an infrastructure of developable parcels which can be conveyed as separate entities or developed comprehensively.

Development Concept
The development concept for Lowry Vista will be guided by the following:

- Create a neighborhood that incorporates multiple uses, including live work possibilities, public services and appropriate public spaces
- Plan a pedestrian friendly environment which incorporates bicycle, vehicle and pedestrians
- Provide streets of major image and character, creating walkable streets that work together as a planned cohesive development hosting a variety of activities
- Create an environment that welcomes walking, strolling, shopping, stopping, sitting, watching, and conversing
- Accommodate a wide mix of uses, such as retail, entertainment, hotel, office, and residential
- Develop open spaces to serve multiple needs
- Create a park space for the surrounding neighborhoods
- Provide a broad mix of housing types, densities and price ranges
- Create a unique, distinctive and identifiable development that unites all characteristics of the existing site (sitrata, sustainability, recycling)
- Develop the site to be creative in the use of storm detention, water quality, wildlife habitat and passive recreation
- Encourage neighborhood & regional public transportation

Design Principles
Development through Lowry Vista will be consistent with the principles set forth by the City and County of Denver. Development should encourage and foster the following:

- Land Use that provides a variety of transportation alternatives (vehicular, pedestrian and bicycle)
- A variety of living and employment opportunities
- Land uses and designs that emphasize water conservation
- Parks and open space that embraces the existing vegetation and respect the natural surroundings

Design Intent
Architectural Character
The item that embraces the existing natural drainage area to the North and West, Alameda Avenue to the South, and the Mira Vista Golf Course to the East isolate the development property of Lowry Vista. While initially this seems an obstacle, the richness of the adjacencies offers tremendous and unique opportunities for the Lowry community separate from the influences of the historical Lowry Air Force Base.

The Lowry Vista development will draw its architectural and material influences from its immediate context of the Natural Area, the visual connection to the Rocky Mountains, and the influence of the sitrata reclamation. When considering urban design strategies, a dedication to making the most of the land reclamation has led to a mixed use strategy of concentrating a variety of uses along Main Street and adjacent side streets including, retail, commercial, hotel, office and residential. Environmentally sensitive materials that evoke the beauty of the natural surroundings in durability, texture, and color will be encouraged to ensure execution of the overall intent.

The West Parcel is envisioned as primarily residential similar to the development of the adjacent AMLI Lowry Development.

Street Character
The street system is intended to be private streets. The primary focus of this development is to encourage pedestrian activity through the creation of an environment that offers a quality experience for people. The scale of buildings and their relationship to the streets combined with the scale and detail of paving, landscape and site elements, encourage walking and offer a variety of pedestrian experiences. A variety of amenities and elements that tell the "story" will be dispersed throughout the development to enhance the experience. Buildings will be oriented toward the street or primary pedestrian circulation routes and ground floor retail will reinforce the pedestrian walk experience. There will be identifiable pedestrian entry points to the buildings from the street. Some of the streets may feature parallel and/or diagonal parking on one or both sides providing close access to uses and a buffer between the pedestrians and moving traffic. Way-finding will be enhanced through clear pedestrian corridors.

At the center of the development is a Main Street that is intended to not only serve pedestrians and the automobile, but also to create the framework of internal organization. Retail mixed-use building fronts line the street to make the space village-like and scaled for the pedestrian that connect the site access points to the natural amenity to the North. Walks, street trees, lighting, furniture, signs and the architecture will all combine to create a clear, consistent language that provides a cohesive and unique image to the development. The street will provide on-street parking for convenience and activity and the orientation of Main Street towards Long's Peak will center on the vista.

Parks, Open Space and Trails
Publicly accessible and usable open space will be integrated within the overall development. The open space system will consist of open space amenities to accommodate the public and connect to the surrounding uses. The conceptual configuration and extent of private open space is identified on Sheet 8A of 14 of the GDP.

Typical landscape development practices of expansive of irrigated turf and water demanding plant life will not be appropriate for this reclamation effort and therefore alternative, more contextually sensitive plant material and landscape practices will be implemented with the desire of creating a unique and natural experience in the Denver area.

DAVIS PARTNERSHIP ARCHITECTS

DATE 05.02.08

DEVELOPMENT CONCEPTS

LOWRY VISTA GDP

LOWRY VISTA

LOWRY VISTA GENERAL DEVELOPMENT PLAN, PROJECT 2007-0483, INTERSECTION OF EAST ALAMEDA AVENUE AT XENIA STREET, CLINTON AND DAYTON STREET
LOCATED IN THE SE QRTR OF SECT 9, SW QRTR OF SECT 10, NW QRTR OF SECT 15, NE QRTR OF SECT 16, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDAN,
CITY AND COUNTY OF DENVER, STATE OF COLORADO

LAND USE CONCEPTS: PRIMARY GDP AREA continued

PRELIMINARY LAND USE BREAKDOWN

Mix of Uses
The development will feature horizontal and vertical mixing of uses. The areas adjacent to Alameda Avenue are anticipated to contain retail and or restaurant uses. The buildings facing Main Street will be retail with residential above and the edges of the development will be predominantly residential.

Residential
The plan currently anticipates a range up to 650 units, or 13 Du/acre, east of the dam and will include a variety of rental and for sale products. The R-2-A parcel will be a maximum of 247 units, or 23 Du/acre, per Ord. No. 604.

Retail
The plan currently anticipates and range up to 450,000 square feet of retail uses. Most of the retail will be located along Alameda Avenue and Main Street, but some small retail and restaurant uses could be developed throughout the site, depending on market conditions.

Hotel
If supported by the development market, the hotel currently anticipates a range up to 250 rooms with approximately 75,000 square feet.

Office
The plan currently anticipates a range up to 120,000 square feet of office space. The majority of office space will be at the second story and above level, but additional office space could be developed at select locations throughout the site, depending on market conditions.

Building Heights
Maximum building heights for the new development will be limited by the Denver Municipal Code based on the proposed zone classifications. The concept is to provide a diversity of building heights throughout the project. The site slopes to the north so as the buildings step up, the site slopes away from Alameda Avenue. The West side of the dam will be similar to the existing AMLI project and will follow there height model. Along Alameda Avenue, the intent is to have 1-2 story building and step up the height toward the north of the development with the maximum height of 8 stories.

Parking
Retail, office and residential parking will be provided in parking structures or surface lots throughout the site and collectively will provide approximately 3,246 spaces. Parking garages will be planned to be integrated within the building development. On-street parallel and/or diagonal convenience parking is planned to support the commercial and residential uses. In addition, dedicated and or shared parking will be provided where appropriate. The West side of the dam will park according to the requirements of the existing zoning.

Specific information regarding parking spaces and parking reductions, if appropriate, will be provided at the plan stage of development approvals.

DEVELOPMENT CONCEPTS continued

DAVIS PARTNERSHIP ARCHITECTS

DATE	NO.	REVISIONS	DRWN	CHKD	APVD

PROJECT NO.
DRGN. ID.
DATE 05.02.08
SHEET NUMBER

LOWRY VISTA GDP

LOWRY VISTA

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NOTES:

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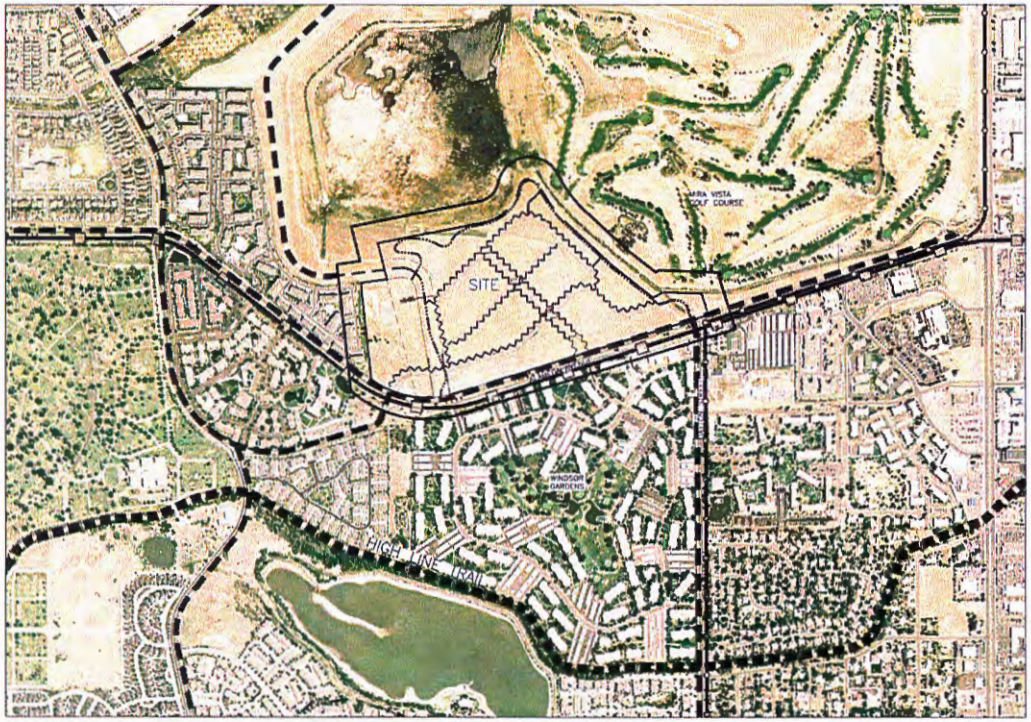

LEGEND

- PRIMARY GDP BOUNDARY
- PROPERTY LINE
- HIGH LINE CANAL TRAIL
- EXISTING REGIONAL TRAILS
- PROPOSED DESIGNATED TRAIL/ BIKE LANE
- ON-STREET CIRCULATION
- RTD EXISTING ROUTE 3
- RTD FUTURE DAYTON ROUTE

TRANSPORTATION/CIRCULATION N
1" = 500'

CIRCULATION CONCEPTS: BICYCLE & PEDESTRIAN

Fundamental Concept:
It is the intent of the development to make all street pedestrian friendly, where the automobile, pedestrian and bicycle have equal importance. This is accomplished by street treatment, speed limits and character of the development. Bicycle parking will be available throughout the development.

Streets
Reference Sheet 6A for internal streets.

Parking
Retail, office and residential parking will be provided in parking structures or surface lots throughout the site. Parking garages will be planned to be integrated within the building development. On-street parallel and/or diagonal convenience parking is planned to support the commercial and residential uses. In addition, dedicated and or shared parking will be provided where appropriate. The Work Line at the dam will park according to the requirements of the existing zoning.

Bicycles
A bicycle connection is proposed from the Lowry Vista site to the existing bicycle trail along the designated bike route on Alameda Avenue. Alameda Avenue trail takes a user west of the site to the Fairmont Drive trail, which to the north connects to the greater Lowry development via Sports Boulevard and to the south connects to the High Line Canal Trail system. This connection allows a trail user to reach all parts of the City via the existing trail system published in the Denver Bike Map. A trail under hazard west on the High Line Canal trail will connect to the City of Aurora's trail system.

Pedestrians
In addition, all of the internal streets will have sidewalks that will accommodate pedestrians. The pedestrian access points into the site are from the paper walk that exists along Alameda Avenue. Primary points are located at the proposed intersections at Xenia Street, Clinton Street and Dayton Street. The introduction of new streets opens up pedestrian access points through the property that have previously been fenced off.

Currently and illegally on this site, the existing dam is being used by pedestrians through the use of non-made paths and the use of existing maintenance road. This portion of the site is under ownership of Lowry Vista with the dam easement under the advisory of Urban Drainage and Flood Control. The proposed intention is to pursue legal trail access along the dam for use as a trail. The final approval for the will come from UDFCD. The access of this possible trail would provide a direct connection to Jackie Robinson Park located in the greater Lowry development. A possible trail head, potentially, exists from Alameda Avenue, could be another planned pedestrian access into the site. Parking may be available in the development for trail users.

Transit
RTD east west bus service route 83 currently provides a bus stop along Alameda Avenue adjacent to Lowry Vista. The pedestrian circulation through the site provides direct access to this service.

There is a tentative Dayton Route which goes south to Aurora, Parker Road and the Nine Mile Park-N-Ride which may become available in the future.

There are plans to incorporate the Windsor Gardens shuttle service into the Lowry Vista site to provide neighborhood serving retail opportunities to the development south of Lowry Vista.

Universal Accessibility
Streets, sidewalks and trails will be designed and built to be universally accessible.

Notes:
Alignment, bicycle and roadways are illustrative in nature and do not represent the final alignment or width. The City and County of Denver grants conceptual approval of general roadway sections and cross-sections through the approval of this GDP.

DAVIS PARTNERSHIP ARCHITECTS

05.02.08

TRANSPORTATION/CIRCULATION: BICYCLE & PEDESTRIAN

LOWRY VISTA

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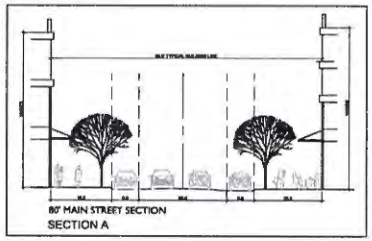
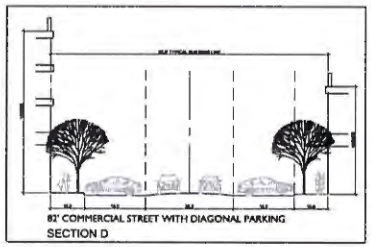
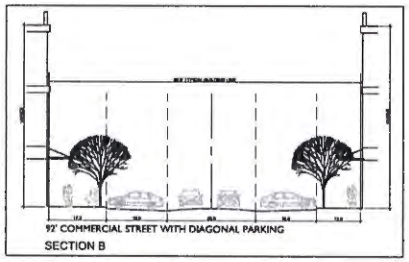


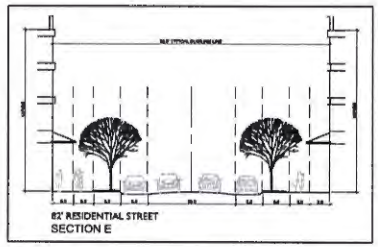
80' MAIN STREET SECTION
SECTION A



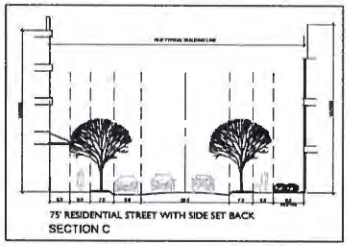
82' COMMERCIAL STREET WITH DIAGONAL PARKING
SECTION D



92' COMMERCIAL STREET WITH DIAGONAL PARKING
SECTION B



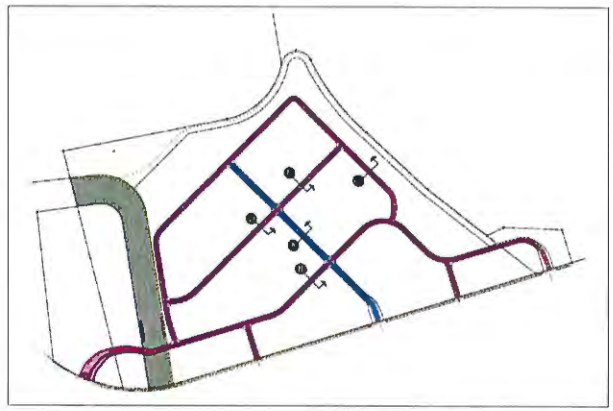
82' RESIDENTIAL STREET
SECTION E



75' RESIDENTIAL STREET WITH SIDE SET BACK
SECTION C

CROSS SECTION NOTES

1. All streets are and will be maintained as private.
2. The cross sections shown in these typologies illustrate rights-of-way only and do not imply City of Denver approval.
3. Roadways are illustrative in nature and do not represent final alignments or widths. The City and County of Denver (CCD) grants conceptual approval of general roadway locations and cross-sections through the approval of this GDP.
4. All roads will have a minimum build to line, with flow line to flow line dimensions, community zones and a clear pedestrian zone, following the requirements of CCD.
5. In some areas, Public works may allow elimination of on-street parking and/or require additional turning movements as determined by site plan level traffic studies.
6. In general, the Denver Streetscape Design Manual shall provide guidance for development of all streets within the Lowry Vista Plan.
7. All cross-section elements in the rights-of-way will meet CCD standards and criteria.
8. No detention pond is allowed to be constructed in ROW and/or City land.
9. The use of planters or trees lawns on the public streets will be determined at the Site Plan level.
10. Parking shown on the sections are illustrative only and may or may not run the entire length of the streets. This will be determined at the site plan level.



STREET SECTION KEY
N.T.S.

STREET CROSS SECTIONS

DAVIS PARTNERSHIP ARCHITECTS

DATE	REV	REVISIONS	DWN	CHKD	APPD

PROJECT NO
DRAWING
DATE 05.02.08
SHEET NUMBER

LOWRY VISTA GDP

LOWRY VISTA

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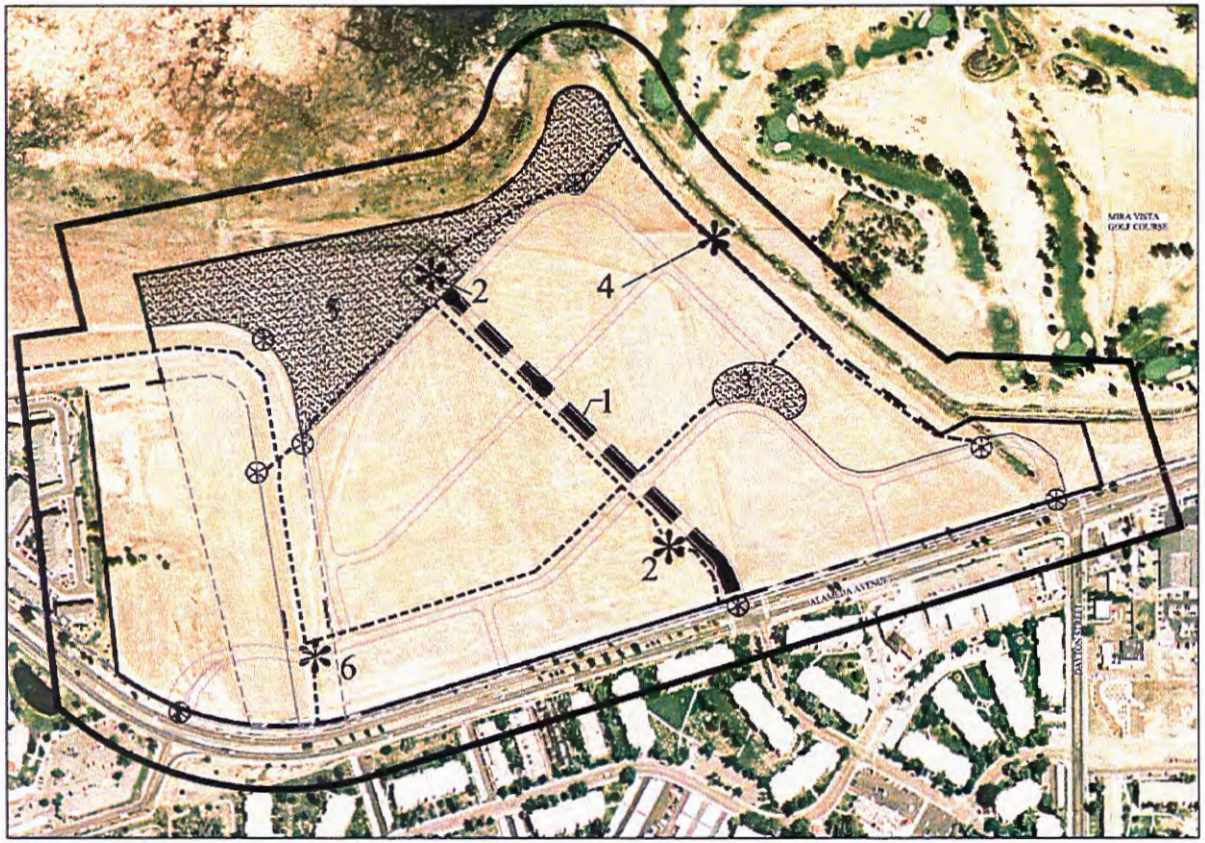

LEGEND

- PRIMARY GDP BOUNDARY
- PROPERTY LINE
- MAIN STREET
- PLANNED TRAIL ACCESS POINT
- CONNECTION BETWEEN OPEN SPACES

OPEN SPACE CONCEPTS
1" = 200'

OPEN SPACE CONCEPTS

1. General Open Space Requirements

The existing conditions of this site support an aggregated open space approach for this development that may be a combination of open spaces where each are; publicly accessible and will remain publicly accessible, entirely useable, and if not maintained by the City, the ownership and continued responsibility for maintenance will be held by an entity capable of managing the open space on a long term basis. Specific information on the aggregated open space is outlined on the chart on page 4 of 14 of this GDP.

The aggregated open space shown is intended be calculated for the mixed use portion of the project located east of the dam. The R-2-A zone west of the dam will follow the requirements of section 59-120 (4) Denver Municipal Code for R-2-A zones in regards to the unobstructed open space requirements. The existing R-2-A site is intended to connect to the mixed use districts through the use of the main east-west road and the proposed pedestrian linkages. The residential area west of the dam will have full access to the aggregated open space east of the dam, but the R-2-A zone is not included in the aggregated open space calculation that is provided in this GDP.

Open Space Definition

For the purpose of this GDP, useable open space is defined as both green and hardscape areas that may include plazas, walkways and landscaped areas open to the sky for recreational and/or leisure uses. Specific to this property, the open space will be newly developed areas. The intent is to provide accessible, useable, and maintainable open space areas that support recreation, leisure and other activities. Open Space areas will provide amenities as appropriate to their location and function within the development and may include paths, picnic/eating areas, seating, landscaping, lighting and others.

2. Open Space Intent

The approximate location and size of open space is shown in this GDP. Specific locations, size and configuration of open space areas will be defined at the site plan level. Some of the conceptual open space locations are intended to be configured around landscape and open spaces that are adjacent to this site. Some of these areas include the natural area to the north and the Mira Vista Golf Course and Westerly Creek drainage to the east. Open spaces will adhere to a number of general principles including:

- Encourage a variety of types of public spaces to serve people of all ages.
- Amenities should support a variety of recreational, leisure, and civic activities.
- Special amenities and/or elements such as water, sculpture, structures, gardens, and others are encouraged to serve as focal points, areas to gather, and as places for special events.
- Open spaces are encouraged to be a combination of landscape and hardscape as appropriate

Develop Open Spaces with Sustainable Practice

Where possible, the development of open space will include practices that use low water vegetation, incorporate Stormwater BMP's and include surface drainage to collection points, such as bioswales to protect the proposed cap.

Protect, Care and Enhance Physical Resources

This site is adjacent to a natural area to the north and the Westerly Creek drainage system to the east which sits outside of the development site. The development, where reasonable, is intended to transition to these areas from a hard developed edge to a natural edge.

Accessible Public Open Space in Every Neighborhood

Per the CCD Park and Recreation "Game Plan", residents increasingly value green breathing spaces that they can walk to within their neighborhood, and provide visual relief from surrounding development. It is intended that green open spaces in this development will be directly accessed through a series of walks.

3. Aggregated Open Spaces

The open space concept is comprised of an aggregation of individual public open space shown in the GDP. The open space needs of the community will be primarily served by distributing a few key accessible open spaces throughout the GDP area. The areas of open space within this GDP are described below.

1. Main Street Streetscape

It is intended for the Main Street to be angled centered onto the vista of Long's Peak with the streetscape primarily hardscape with areas of landscape and amenities to support the values named in the Parks and Recreation "Game Plan" for "Green Grids". The Main Street streetscape is intended to provide an important public connection down the center of the development and will be a place for pedestrians to access the mixed uses planned for this area of the site. The street is intended to be a flexible space that supports pedestrian and vehicular flows. The widths of the pedestrian areas are intended to be suitable to accommodate outdoor events and activities, especially at mid blocks where the sidewalks get wider. The Main Street is not a part of the aggregated open space calculation, but is an important connector the the open spaces and integral to the character of the development.

2. Public Plazas

The Public Plazas are intended to be areas for community interaction and create a variety and interests and special amenities such as cafe's, kiosks and seating. There are two Public Plaza areas planned, one with visibility from Alameda Avenue, which is intended to be a large pedestrian plaza at the terminus of Main Street which will be developed as focal point and activity center for the development. Landscape, hardscape and amenities could be combined to provide an active pedestrian space. The approximate size of this space can be referenced in the aggregated open space chart on Sheet 2 of 16 of this GDP. The actual size and use will be determined at the Site Plan Phase.

A smaller plaza is planned at the southwest edge of Main Street and is intended to be a smaller version of the larger plaza. This area is envisioned to serve as a organizing feature to a group of buildings that could focus onto the plaza, such as restaurants with outdoor seating to activate the area. The approximate size of this space can be referenced in the aggregated open space chart on Sheet 2 of 16 of this GDP. The actual size and use will be determined at the Site Plan Phase.

3. Traditional Public Park

The intention of this traditional public park located at the terminus of the main east west road is to serve as an open space and park for the community and users of the development. The size of this landscaped open area combined with its position central to possible residential make it ideal as the main open space/Traditional Public Park within the proposed community. This area also has vistas to the golf course and drainage corridor. The Trail System described in number 4, along with the proposed street system will connect this park to the larger system of public open spaces within this community and the surrounding neighborhoods. The approximate size of this space can be referenced in the aggregated open space chart on Sheet 2 of 16 of this GDP. The actual size and use will be determined at the Site Plan Phase.

DAVIS PARTNERSHIP ARCHITECTS

05.02.08

OPEN SPACE CONCEPTS

LOWRY VISTA

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OPEN SPACE CONCEPTS: continued

4. Pocket Parks along Trail System
The intent of the pockets parks are to be used by both residences and the community as outdoor spaces. These parks are located along the east edge of the property located along the trail system that parallels the Westerly Creek drainage. Each pocket park will frame views of the golf course from the surrounding development. The proposed trail will be part of the internal trail system that runs along the east and north side of the property along the natural areas off site. Each pocket park is intended to be a public stop along the proposed trail system. The approximate size of these spaces can collectively be referenced in the aggregated open space chart on Sheet 2 of 18 of this GDP. The actual size and use will be determined at the Site Plan Phase.

5. Natural Area
The intent of the Natural Area is to balance the needs of the existing wildlife and natural vegetation with the urban edge of the development in a passive way. Visible from the large plaza, although approximately 20 feet below, an existing drainage area which is approximately 100 acres sits just off site. The proposed Natural Area could be accessible to pedestrians by trails and may introduce more natural materials and native plant species. The grade change from the large plaza down to the natural area will be determined at site plan level. A combination of landscape, hardscape, and amenities can help transition to the Natural Area and trail system that is proposed. The approximate size of this space can be referenced in the aggregated open space chart on Sheet 2 of 18 of this GDP. The actual size and use will be determined at the Site Plan Phase.

6. Dam Easement Trail and Trailhead
The intent of the dam easement and trailhead is to provide a clearly defined area for pedestrians and bicycles to travel off-site. Although the majority of this space is not included in the aggregated open space calculations, it is important to note that the dam easement will possibly, if approved by UDFC, have a trail on it with various connections throughout the site. Five (5) feet on either side will be included in the aggregated open space calculation, while the rest will remain undeveloped as native grasses or unimproved. This dam trail links a significant pedestrian/bicycle connection to the greater Lowry development and the High Line Canal Trail to the south. A proposed trailhead is envisioned to serve both as an internal vista into the Lowry Vista development from Alameda Avenue, as well as function as a pedestrian/bicycle trailhead. The approximate size of this space can be referenced in the aggregated open space chart on Sheet 2 of 18 of this GDP. The actual size and use will be determined at the Site Plan Phase.

DAVIS PARTNERSHIP ARCHITECTS

DATE	REV	COMMENTS	INIT.	CHKD	APVD
05.02.08	1				

PROJECT NO.
DRAWN BY
DATE 05.02.08
SHEET NUMBER

OPEN SPACE CONCEPTS continued

LOWRY VISTA

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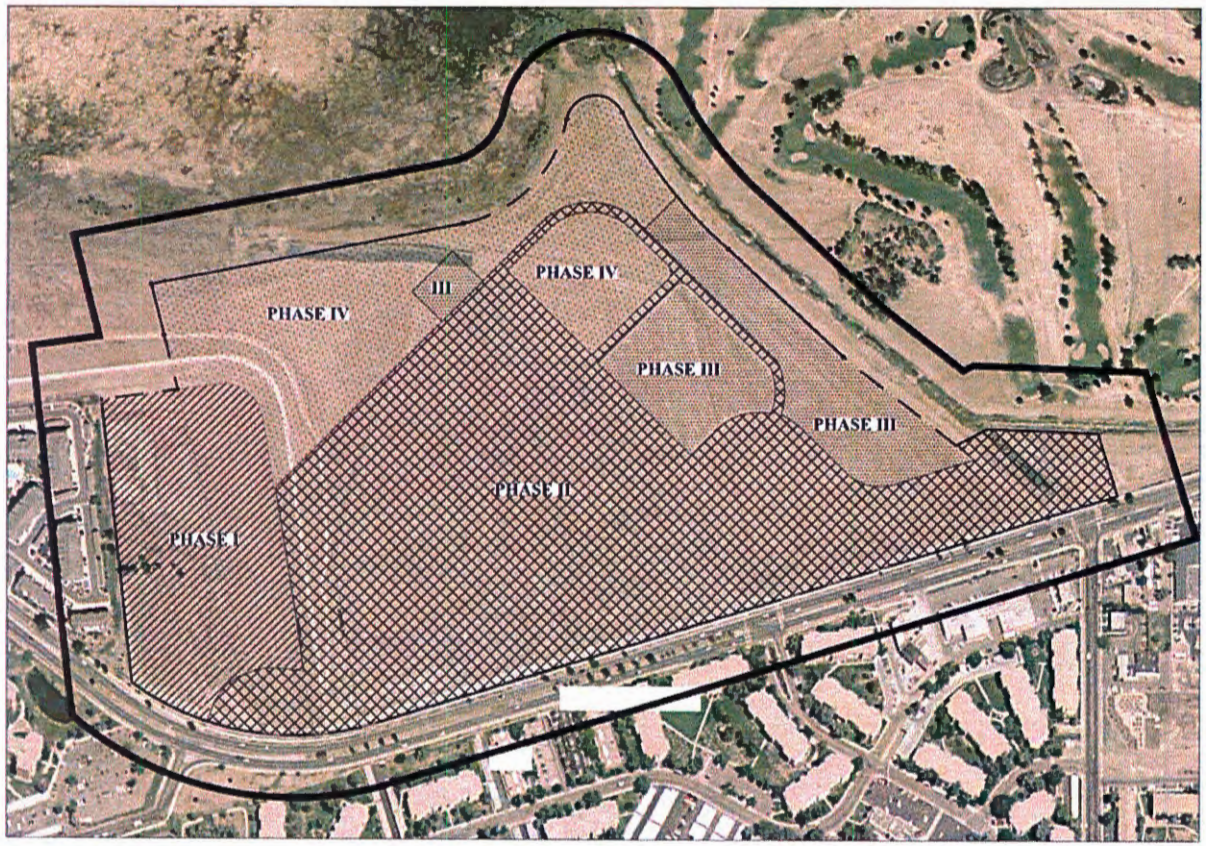

LEGEND

- PRIMARY GDP BOUNDARY
- PROPERTY LINE
- PROPOSED PHASE 1
- PROPOSED PHASE 2
- PROPOSED PHASE 3
- PROPOSED PHASE 4

PHASING PLAN
1" = 200'

PHASING AND IMPLEMENTATION

The first phase of development will be infrastructure and construction of the R-2-A residential property west of the dam. This first phase is anticipated to take approximately 2 years.

Phase two will begin as phase one is under construction and will consist of the infrastructure east of the dam and includes mixed use construction of the site along Alameda Avenue and west of Main Street. Phase Two is proposed to take approximately 5 years.

The third phase is scheduled to begin when phase one is complete and phase two is not way through construction. This phase includes the large piece at the end of Main Street and part of the National Area to the north of the property. This phase also includes the construction east of main street along the golf course and the southern mixed use garage and building area east of main street. This phase is expected to take 2 years to complete.

The fourth and final phase will be the construction along the north end of the property including the remainder of the natural area and the remaining garage and mixed use area. This phase will begin as phase three is completing. This phase is expected to take 3 years to complete.

The intent of the development is to continue to progress in development and construction within a 10 year timeframe, based on market conditions.

PHASE	APPROXIMATE YEARS	IMPROVEMENTS AND ACTIONS
PHASE I	0-1 YEARS 1-2 YEARS	INFRASTRUCTURE WEST OF DAM RESIDENTIAL BUILDING CONSTRUCTION
PHASE II	0-2 YEARS 1-3 YEARS 3-5 YEARS	INFRASTRUCTURE MIXED USE BUILDING CONSTRUCTION BUILD-OUT
PHASE III	5-7 YEARS	PARKING STRUCTURE / RESIDENTIAL CONSTRUCTION
PHASE IV	7-10 YEARS	PARKING STRUCTURE / RESIDENTIAL CONSTRUCTION

DAVIS PARTNERSHIP ARCHITECTS

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PHASING PLAN

LOWRY VISTA GDP

LOWRY VISTA

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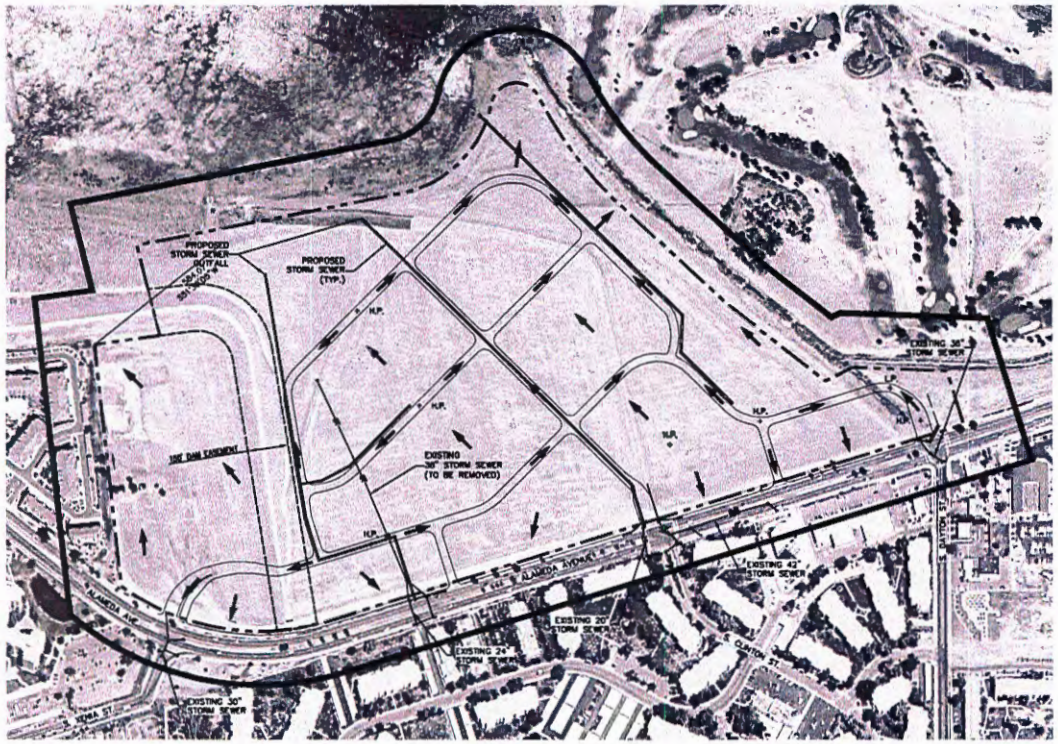


STORM WATER CONVEYANCE AND DETENTION:

LOWRY VISTA WILL BE DEVELOPED IN ACCORDANCE WITH THE LOWRY MASTER DRAINAGE PLAN ADDENDUM #2 AND THE DENVER STORM DRAINAGE MASTER PLAN. THE MAJORITY OF THE SITE WILL DRAIN TOWARDS WEATHERLY CREEK POND, WHICH WILL BE PROVIDE DETENTION FOR THE SITE. DRAINAGE FROM SOUTH OF ALAMEDA WILL BE CONVEYED THROUGH THE SITE VIA STORM SEWER SYSTEMS AND RUNOFF FROM THE AREA WEST AND SOUTH OF THE DAM EMBANKMENT WILL BE TAKEN TO THE NORTHWEST CONNECTING TO THE EXISTING STORM SEWER SYSTEM OF THE ADJACENT DEVELOPMENT, IN ACCORDANCE WITH THE DENVER STORM DRAINAGE MASTER PLAN.

NOTES:

1. ALL PROPOSED UTILITIES SHOWN ARE CONCEPTUAL AND ARE SUBJECT TO CHANGE WITH REVISIONS OF THE SITE PLAN.
2. THE STORM SEWER SYSTEM WILL BE DESIGNED IN ACCORDANCE WITH DENVER WASTEWATER STANDARDS.

LEGEND

- GDP BOUNDARY
- OWNERSHIP BOUNDARY
- DAM EASEMENT
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED RUNOFF FLOW DIRECTION

NOTE:
THIS EXHIBIT IS NOT A MONUMENT BOUNDARY SURVEY, IMPROVEMENT SURVEY OR LAND TITLE SURVEY. IT IS INTENDED ONLY TO BE A MAP SHOWING THE SELECTED PROPERTY INFORMATION OBTAINED FROM SEPARATE CERTIFIED SURVEYS

STORM WATER AND DETENTION
1" = 200' N

HARRIS KOCHER SMITH
engineering and surveying
1391 Speer Blvd., Suite 360
Denver, Colorado 80204
Phone (303) 623-6300
Fax (303) 623-6311

STORM WATER COVEYANCE AND DETENTION

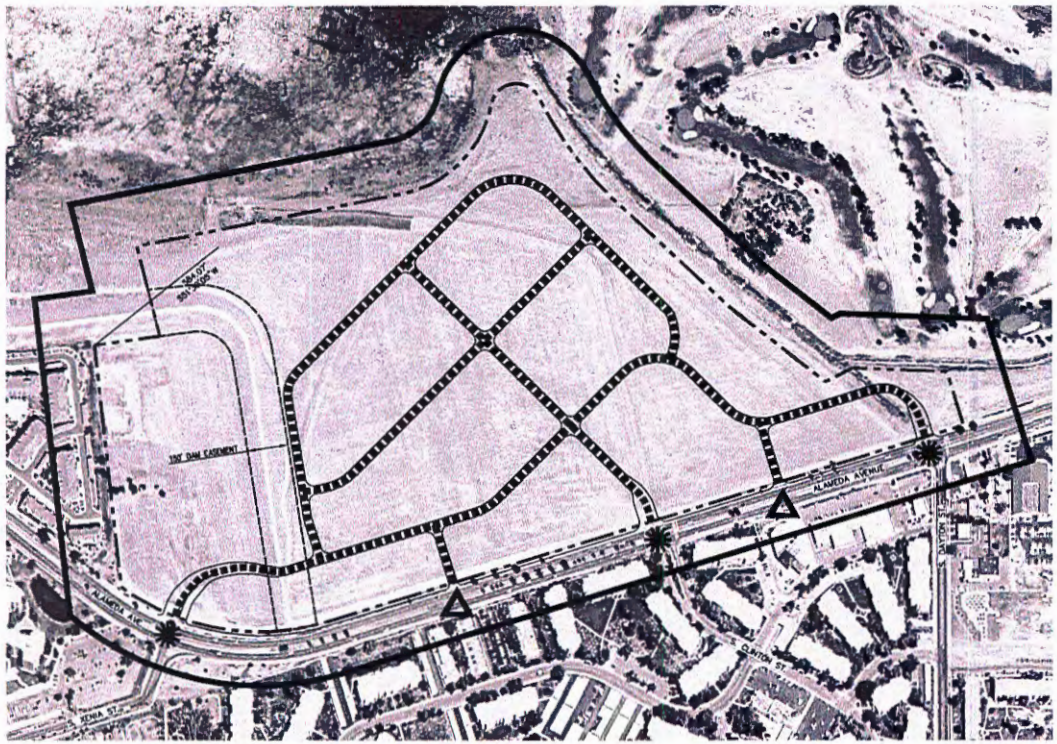
DAVIS PARTNERSHIP ARCHITECTS

DATE	NO.	REVISIONS	DRWN	CHKD	APPD

PROJECT NO. 07006.00
DATE 05.02.08
SHEET NUMBER 9 of 14
GDP

LOWRY VISTA

LOWRY VISTA GENERAL DEVELOPMENT PLAN, PROJECT 2007-0483, INTERSECTION OF EAST ALAMEDA AVENUE AT XENIA STREET, CLINTON AND DAYTON STREET
LOCATED IN THE SE QRTR OF SECT 9, SW QRTR OF SECT 10, NW QRTR OF SECT 15, NE QRTR OF SECT 16, TOWNSHIP 4 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
CITY AND COUNTY OF DENVER, STATE OF COLORADO



STREET CLASSIFICATION:

ALL INTERIOR ROADS ARE CONCEPTUAL PRIVATE DRIVES AND DO NOT REPRESENT FINAL LOCATIONS.

CIRCULATION CONCEPTS:

1. **Vehicular**

ACCESS TO LOWRY VISTA WILL BE ACCOMMODATED BY ALAMEDA AVENUE PARKWAY, S. XENIA STREET, S. CLINTON STREET AND S. DAYTON STREET. THERE ARE EXISTING SIGNALIZED INTERSECTIONS AT ALAMEDA AVENUE & S. CLINTON STREET AND ALAMEDA AVENUE & S. DAYTON STREET (ALAMEDA AVENUE & S. XENIA INTERSECTION IS UNSIGNALIZED). FULL-MOVEMENT INTERSECTIONS ARE PROPOSED AT ALAMEDA AVENUE & S. XENIA STREET, ALAMEDA AVENUE & S. CLINTON STREET AND ALAMEDA AVENUE & S. DAYTON STREET. TWO PROPOSED RIGHT-IN/RIGHT-OUTS ARE LOCATED ALONG ALAMEDA AVENUE THAT ENTER LOWRY VISTA VIA PRIVATE DRIVES.

2. **Proposed Transportation Improvements :**

PUBLIC IMPROVEMENTS

A) AUXILIARY LANE WIDENING ON ALAMEDA AVENUE.
B) NEW TRAFFIC SIGNAL AT ALAMEDA AVE. / S. XENIA ST.
C) MODIFICATION OF EXISTING TRAFFIC SIGNAL AT ALAMEDA AVE. / S. CLINTON ST.
D) MODIFICATION OF EXISTING TRAFFIC SIGNAL AT ALAMEDA AVE. / S. DAYTON ST.

LEGEND

- GDP BOUNDARY
- OWNERSHIP BOUNDARY
- DAM EASEMENT
- PROPOSED FULL-MOVEMENT SIGNALIZED INTERSECTION
- PROPOSED RIGHT-IN/RIGHT-OUT INTERSECTION
- PROPOSED PRIVATE DRIVE

TRANSPORTATION / CIRCULATION
1" = 200' N

NOTE:
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HARRIS KOCHER SMITH
engineering and surveyors
1391 Speer Blvd., Suite 300
Denver, Colorado 80204
Phone (303) 623-6300
Fax (303) 623-6311

TRANSPORTATION/CIRCULATION: VEHICULAR

DAVIS PARTNERSHIP ARCHITECTS

DATE	NO.	REVISIONS	BY

PROJECT NO.
DRAWN BY
CHK'D BY
APPD BY
DATE 05.02.08
SHEET NUMBER
6A of 14

APPENDIX B

PERMITS

To be determined.

FREMONT ENVIRONMENTAL INC.

October 24, 2005

Ms. Elizabeth Sopher
Lowry Assumption, LLC
555 Uinta Way
Denver, CO 80230-6917

Subject: **Health and Safety Plan**
Lowry Assumption LLC
Fremont Project No. C005-007

Dear Elizabeth:

Enclosed is the Health and Safety Plan for the Lowry Site. This plan was developed to identify potential site hazards and establish controls for tasks involving hazardous substances on the Lowry Redevelopment site. The plan is required by the Occupational Safety and Health Administration under the Hazardous Waste Operations and Emergency Response Standard, 29 CFR 1910.120. It applies to field tasks on the Lowry site.

Fremont Environmental appreciates the opportunity to provide this service. Please contact me at (720) 351-8984 if you have any questions regarding this plan.

Sincerely,

FREMONT ENVIRONMENTAL INC.

Joan Henehan, P.E., C.I.H., C.S.P.
Senior Engineer

Enclosure

1530 BOISE AVENUE, SUITE 205, LOVELAND, CO 80538
(970) 663-2301 (DIRECT), (970) 663-2300 (FAX)

EXHIBIT 5

DRAFT SITE HEALTH AND SAFETY PLAN

LOWRY ASSUMPTION, LLC

LOWRY REDEVELOPMENT

FREMONT PROJECT NO. C005-007

Prepared by:

Fremont Environmental Inc.
1530 Boise Avenue, Suite 205
Loveland, Colorado 80538
(970) 663-2301

October 24, 2005

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SITE HEALTH AND SAFETY PLAN
LOWRY ASSUMPTIONS, LLC
LOWRY REDEVELOPMENT
FREMONT PROJECT NO. C005-007

1.0 INTRODUCTION

This site-specific health and safety plan (HASP) was developed to provide safety guidelines and control measures for employees of International Risk Group, LLC (IRG) and its affiliates and subsidiaries working on behalf of the Lowry Assumption, LLC (LAC) during the implementation of the remediation activities defined in the Consent Agreement between the Colorado Department of Public Health and Environment (CDPHE) and the LAC at the former Lowry Air Force Base (LAFB). It applies to IRG employees directly involved in coordinating and managing field activities on the LAFB. This HASP was prepared in accordance with applicable Occupational Safety and Health Administration (OSHA) standards and specifically addresses the requirements of 29 Code of Federal Regulations (CFR) 1910.120, Hazardous Waste Operations and Emergency Response.

1.1 Application

Information regarding environmental conditions of the property was developed under the Air Force Installation Restoration Program (IRP) and conducted pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Defense Environmental Restoration Program (DERP) and other applicable Federal and state regulations. Specific clean-up operations are corrective actions covered by the Resource Conservation and Recovery Act of 1976 (RCRA) issued by the Colorado Department of Public Health and Environment (CDPHE) as consent orders. The OSHA 1910.120 standard applies to clean-up operations conducted under these standards.

Extensive site characterization and cleanup has been completed since the AFB closed in 1994. Environmental cleanup of the groundwater and closure of the landfill were privatized in August 2002; cleanup of the remaining soil issues were privatized in 2005. These activities are managed by the Lowry Redevelopment Authority (LRA) and its contractor, LAC. LAC is responsible for the property restoration and identification of additional environmental conditions during the course of development activities, pursuant to the Consent Agreement effective December 22, 2006.

1.2 Purpose

The purpose of this HASP is to describe chemical and radiological hazards historically present on the site and to provide control measures and procedures for protecting IRG field personnel assigned to the LRA project. This plan has been developed for IRG employees working on the LAFB only. IRG employees are responsible for coordinating and managing field activities associated with the redevelopment of the former base property for residential and commercial use.

Specific remediation and redevelopment tasks are subcontracted as redevelopment progresses to firms with applicable expertise. The majority of contracts associated with the redevelopment efforts are construction-related. This plan does not apply to these tasks or to subcontractor

employees. Subcontractors are required to develop and comply with their own HASP that protects their employees from site hazards.

IRG field activities associated with this site include general oversight of subcontractor tasks. Generally, this involves ensuring that subcontractors are complying with the specifications of their contract. In addition, IRG field personnel will assess unanticipated environmental hazards if encountered by subcontractors. They may also characterize unanticipated hazards through sampling when it is safe to do so. Unique hazards, such as unexploded ordnance (UXO), will be sampled and abated only by qualified contractors.

This plan specifically addresses:

- Potential hazards that may be encountered during redevelopment tasks,
- Responsibilities of key project personnel for the health and safety of employees and the public from potential site hazards and for identifying and minimizing risks from hazards through communication and the implementation of appropriate controls,
- Training for site employees including the specific requirements of this HASP and other necessary programs to ensure that they can appropriately anticipate, identify and control exposures to site hazards,
- Exposure monitoring requirements for assessing site hazards and protecting site personnel and the public,
- Area monitoring requirements for ensuring that site hazards do not migrate from designated work zones,
- Emergency response procedures for anticipated or unexpected hazards or hazardous situations, and
- Safety guidelines needed to protect site personnel, visitors, and the public from physical and environmental hazards associated with redevelopment tasks.

2.0 SITE DESCRIPTION

LAFB is located approximately five miles southeast of downtown Denver. It covers approximately 1,866 acres and is generally located between Quebec Street to the west, Eleventh Avenue to the north, Dayton Street and Havana Street to the east and Alameda Avenue to the south. More than half of the property is located in the city of Denver (Denver County) and the remainder in the city of Aurora (Arapahoe County). A site map is provided as Figure 1.

2.1 Site History

LAFB was established as a technical training facility for the Army Air Corps Technical School in 1937. It was scheduled for permanent closure under the Base Realignment and Closure (BRAC) Act of 1988 and the Defense Base Realignment and Closure Act of 1990. It was formally closed on September 30, 1994. Tasks and facilities associated with the former base included:

- aircraft storage and maintenance,
- waste disposal (landfill areas, hazardous waste storage, and a fly ash disposal area),
- vehicle maintenance and storage,
- medical and dental clinics,

- aircraft and vehicle fueling,
- coal storage areas,
- housing,
- classroom facilities,
- administration buildings,
- recreation areas (swimming pools, ball fields, and golf course), and
- warehouse facilities.

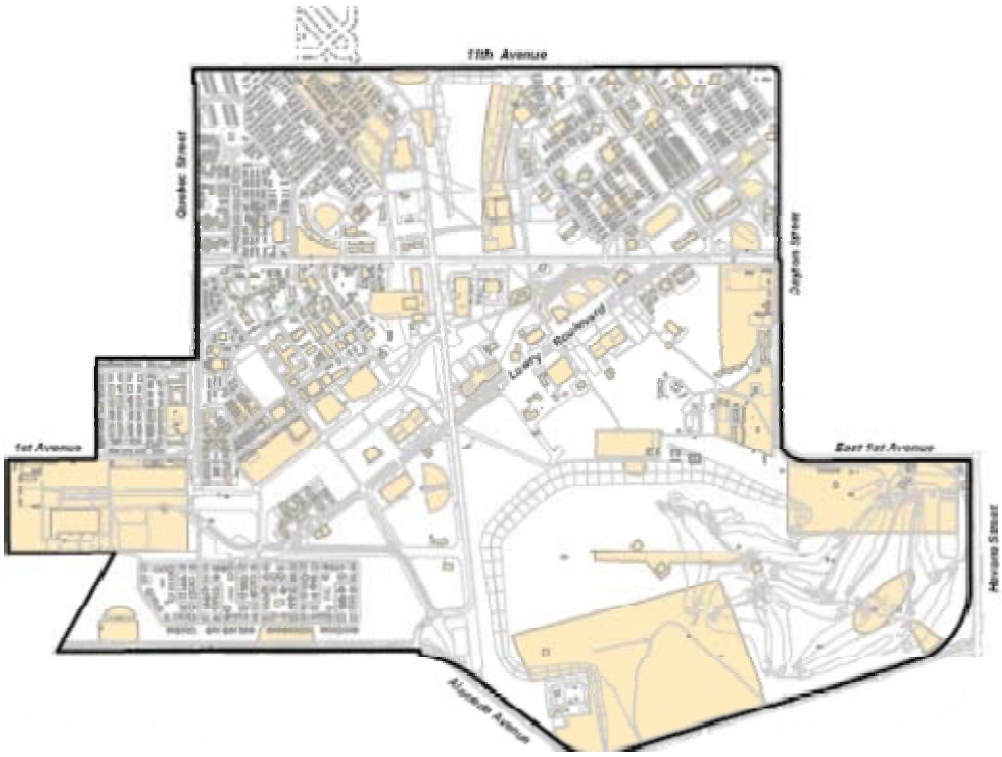


Figure 1: Lowry Site Map (from Final Executive Summary, January 2005, RCRA Facility Assessment Report)

Chemicals were utilized for many of these activities in accordance with standard practices at the time. Chemical substances were also used as part of training programs. Training programs, which in some cases used dummy chemicals, involved the following:

- armament,
- chemical warfare,
- fire fighting,
- flight and avionics,
- missiles,

- ordnance,
- photography, and
- Precision Measurement Equipment Laboratory (PMEL).

Current response actions include the Fire Training Zone soil remediation, the Outdoor Firing Range soil and lead remediation, asbestos soil removal at Building 670, closure of the 75-acre base landfill located at the south-central portion of the base, groundwater remediation and monitoring at Building 606, mercury remediation at Building 898, abandonment of former water supply wells at Buildings 950 and 1435, investigations of two septic tanks/leach fields, and asbestos in soils investigation and cleanup in the Northwest Neighborhood (Final RFA Report, January 2005).

3.0 ORGANIZATION AND RESPONSIBILITIES

LAC is committed to providing a safe work environment for IRG and its employees. All site personnel are responsible for understanding the safety requirements established for this site and discussed in this plan. Key site personnel are identified in Figure 2.

3.1 Program Manager

The Lowry Program Manager is ultimately responsible for the safety of site employees and for protecting the public and the environment from hazards associated with project tasks. The Program Manager is also responsible for ensuring that adequate resources are available for necessary safety controls. The Program Manager will ensure that subcontractors comply with the specified requirements of their contracts and that IRG tasks are conducted in accordance with established procedures in this HASP and other applicable sound safety practices.

3.2 Project Manager

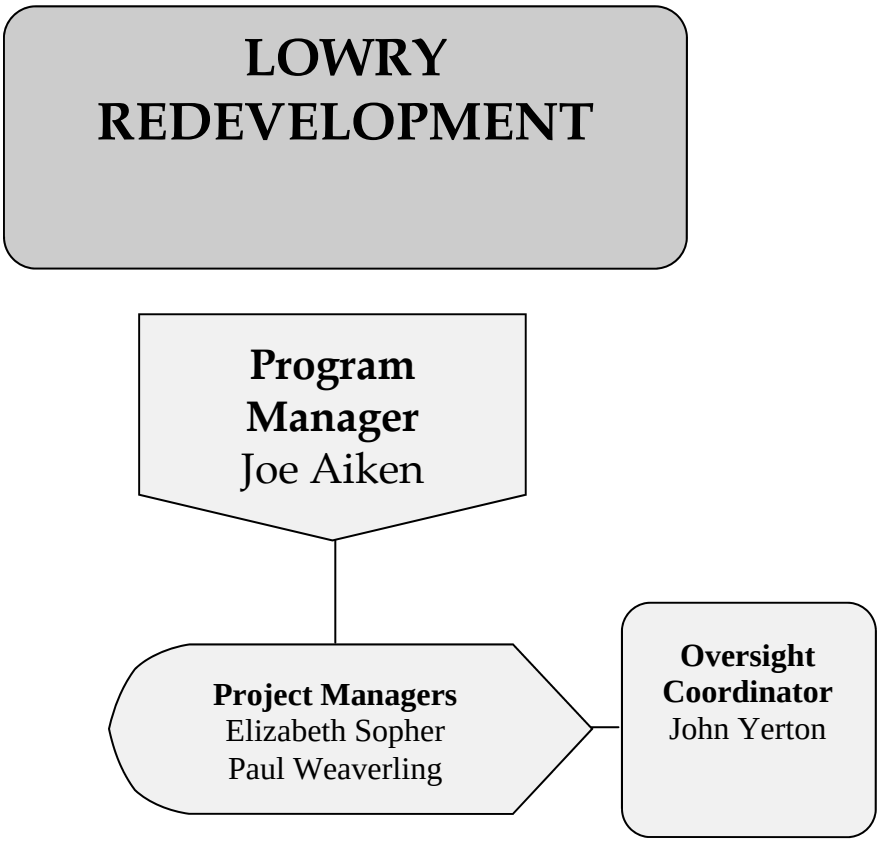
The Project Manager (PM) is responsible for approving this site-specific HASP and any revisions or addendums to the plan. The PM is also responsible for implementing the HASP and ensuring that adequate resources are available as needed for controls specified in the HASP.

3.3 Oversight Coordinator

The Oversight Coordinator or designate will be on site for invasive ground activities in designated areas of the site where the potential for exposure to contaminated soil, ground water or debris exists. The Oversight Coordinator will ensure that subcontractors perform work in accordance with safe work procedures, that airborne contaminants are controlled, and that the surrounding population and environment are protected.

3.4 Visitors

All visitors will be escorted by an IRG employee or designate in controlled areas during tasks where the possibility of exposure to hazardous substances exists. Prior to accessing these areas, visitors will be informed of the hazards that may exist and read the relevant portion of the HASP. Following the safety briefing, they will sign the appropriate form (see Appendix A) acknowledging that they are aware of the hazards and will follow safety procedures for the controlled location.



4.0 HAZARD ASSESSMENT

Due to the historical use of Lowry property as a former Air Force Base, chemical and radiological hazards have been investigated on the site. Significant characterization data is available from both historical records and samples (i.e., soil, groundwater, surface water and air) obtained during site investigation and cleanup efforts. Characterization data provides information on both the location of potential contaminants and anticipated concentrations.

The following specific hazards potentially exist and may be encountered on the site as the redevelopment continues.

- Petroleum
- Chlorinated solvents
- Oil/grease
- Coal
- Fly ash
- PCBs
- Friable and non-friable asbestos
- Lead
- Metals
- PAHs
- Pesticides

- Mercury

During the investigations, most of these contaminants have been identified in the soil or ground water in isolated areas and response actions have been performed or are planned where necessary. Contaminants were typically present in the soil and ground water in the parts per million (ppm) range. Sludge has been identified in septic tanks and oil/water separators. Similar concentrations have been identified in sludge samples. Many substances in the above list are not volatile; they present a more significant hazard as an airborne dust than as a vapor. Suppression of airborne dust will significantly minimize or prevent exposure to many site contaminants if they are identified in the future.

The ground water elevation varies across the site from approximately 8 to 60 feet below the ground surface. Contact with ground water is not anticipated during most excavation or trenching tasks. However, contaminated ground water may be encountered in the Lowry East section due to the shallow ground water elevation in this area. Adequate controls, including air engineering controls, monitoring and the use of PPE, will be utilized for utility or trenching operations reaching depths at or near the ground water level in areas overlying contaminated ground water where appropriate.

This section discusses hazards associated with contaminants historically identified on this site. Toxicological risks vary and health affects depend on the degree and extent of exposure.

4.1 Petroleum - Hazards and Controls

Health effects associated with exposure to petroleum vary and depend upon the route of exposure, formulation of the material, and the level and duration of exposure. Potential routes of exposure associated with Lowry site tasks include skin contact and inhalation of volatilized petroleum constituents. Ingestion of contaminated material is less likely but can occur through poor industrial hygiene practices such as smoking or eating with soiled hands.

Acute health effects associated with petroleum exposure include irritation of the eye, skin, and mucous membrane. Health effects become more pronounced with increasing concentrations and can include nausea, headache, fatigue, and dizziness; unconsciousness can occur at very high concentrations. Dermatitis is associated with repeated exposure of the skin to petroleum. Organs affected by gasoline exposure include the eyes, skin, respiratory system, central nervous system (CNS), liver, kidneys. Benzene, a common constituent of gasoline, is a known human carcinogen associated with leukemia.

Volatilized petroleum presents a serious fire hazard. The explosive limits are about 1.4% and 7.6% (formulations vary) and the flash point is about -50°F. The vapor density of petroleum is three to four times heavier than air further increasing the exposure and fire risk in enclosed areas. It is also not miscible with water (low ppm range) and is less dense allowing it to separate and collect on water surfaces.

Petroleum may be encountered in soil, ground water or in closed containers such as drums or underground storage tanks. The potential for vapor inhalation exists in all circumstances. Exposure to petroleum vapors from contaminated soil at concentrations anticipated on the

Lowry site can usually be controlled by standing or working up wind. The odor threshold of gasoline is about 0.3 ppm, well below published exposure limits (see Table 1), allowing it to be readily detected at low concentrations.

TABLE 1: PETROLEUM EXPOSURE LIMITS

Substance	OSHA PEL/ACGIH TLVs				
	8-Hour Time Weighted Average	Short-Term Exposure Limit	Acceptable Ceiling Concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
				Concentration	Maximum Duration
Benzene	1 ppm/0.5 ppm	5 ppm/2.5 ppm	-	-	-
Ethylbenzene	100 ppm/100 ppm	none/125 ppm	-	-	-
Gasoline	none[1]/300 ppm	none[1]/500 ppm	-	-	-
MTBE	none/50 ppm	none	-	-	-
Naphthalene	10 ppm/10 ppm	none/15 ppm	-	-	-
Toluene	200 ppm/50 ppm	none	300 ppm	500 ppm	10 minutes
Total inorganic lead	50 $\mu g/m^3$/50 $\mu g/m^3$	none	-	-	-
Xylene	100 ppm/100 ppm	none/150 ppm	-	-	-

[1]OSHA no longer publishes a Permissible Exposure Limit (PEL) for gasoline and/or petroleum distillates. Their current policy states that "the composition of these materials varies greatly and thus a single Threshold Limit Value (TLV) for all types of these materials is no longer applicable. The content of benzene, other aromatics and additives should be determined to arrive at the appropriate TLV."

Exposure to petroleum constituents will be controlled through the use of personal protective equipment (PPE), air monitoring and administrative controls. Site tasks with the highest potential for petroleum exposure include sampling of tanks or other bulk containers or entry into excavations with petroleum-contaminated soil. Neither of these tasks is anticipated but may occur as redevelopment progresses. Controls will be utilized to ensure that exposure levels are maintained below published exposure levels.

PPE is required for tasks where petroleum product or contaminated media such as soil or groundwater may be encountered. The use of respirators is not anticipated but may be warranted in enclosed spaces or when sampling concentrated product in bulk containers. A Job Safety Analysis will be developed for any task warranting the use of a respirator. Nitrile or Viton gloves will be utilized when handling petroleum contaminated media.

Monitoring will be conducted during tasks which may result in exposure to petroleum vapors. See Section 8.0 for air monitoring actions levels.

4.2 Chlorinated Solvents - Hazards and Controls

Several chlorinated hydrocarbons have been identified in soil and groundwater on the site including perchloroethylene (PCE), trichloroethylene (TCE), and 1,2-dichloroethane (DCA). The likely routes of exposure to chlorinated solvents include inhalation, ingestion and direct contact with the skin or eye.

The toxicity of chlorinated solvents varies; many affect the CNS and some are identified as carcinogens. PCE can affect the CNS and cause irritation of the skin, eyes, and upper respiratory tract. TCE can depress the CNS, affect kidneys, liver, and lungs and can cause rapid and irregular heartbeat. Toxic effects are increased when combined with alcohol, caffeine, and other drugs. DCA can cause CNS depression and damage to the liver, kidneys, heart, and digestive system. Eye contact with DCA can cause irritation and serious injury if not removed promptly.

DCA and TCE are flammable liquids; the LEL of both solvents are approximately 6% and their flash points are less than 100°F. PCE is not considered flammable. These chlorinated solvents are only slightly soluble in water.

Exposure levels will be maintained below OSHA PELs as shown in Table 3. Colorimetric tubes will be used in situations where chlorinated solvents may be encountered. A standard photoionization detector (PID) equipped with a 10.6 eV lamp will not ionize several of these chlorinated solvents and, thus, cannot be used for detecting their presence. A PID equipped with an 11.7 eV lamp is required to detect these contaminants. Air monitoring action levels are included in Section 8.0.

TABLE 2: CHLORINATED SOLVENT EXPOSURE LIMITS

Substance	OSHA PEL (ppm)			
	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
1,2-DCA	50	100	200	5 min in any 3 hrs
TCE	100	200	300	5 min in any 3 hrs
PCE	100	200	300	5 min in any 2 hrs

Viton gloves will be used when sampling or handling media contaminated with chlorinated solvents. The use of air purifying respirators is not recommended for some chlorinated solvents since the odor threshold is not an adequate warning property for cartridge saturation.

4.3 Coal Dust - Hazards and Controls

Chronic inhalation of coal dust can directly affect lung function. Exposure to airborne levels of coal dust at or above the OSHA PEL (2 mg/m^3) is not anticipated on the Lowry site. Basic controls will be implemented when working at or in the vicinity of the former coal storage yard to ensure that the airborne dust is controlled through suppression measures. Nitrile or latex gloves will be worn for sampling tasks.

4.4 Fly Ash - Hazards and Controls

The fly ash present on the site has been characterized through analysis; hazardous constituents detected in the fly ash include coal tar pitch volatiles, pesticides, boron and selenium. Specific coal tar pitch volatiles include anthracene, chrysene, fluorene and phenanthrene. Exposure to anthracene, chrysene and phenanthrene is regulated by OSHA at 0.2 mg/m^3. Exposure to coal tar pitch volatiles can irritate the skin. Target organs include the kidney, lung and skin. Coal tar pitch volatiles are also considered a potential carcinogen. Potential exposure levels associated with concentrations detected in the fly ash are not anticipated to reach or exceed OSHA PELs.

Pesticides detected in the fly ash include aldrin, delta-BHC (lindane), heptachlor and methoxychlor. The primary acute toxic action of organochlorine pesticides is on the nervous system. They can be absorbed through the skin. Pesticide-contaminated dust particles trapped in respiratory mucous, when swallowed, can be absorbed in the gastrointestinal tract.

Selenium is a trace mineral; it is needed in small amounts for good health. However, exposure to higher concentrations can result in neurological effects. Short-term oral exposure to high concentrations of selenium may cause nausea, vomiting, and diarrhea. Chronic oral exposure to high concentrations can cause hair loss, nail brittleness, and neurological abnormalities.

Boron is a trace mineral. It is not considered toxic except at high concentrations.

The following table includes the OSHA PELs for individual constituents detected in the fly ash.

TABLE 3: FLY ASH CONSTITUENT EXPOSURE LIMITS

Constituent	OSHA PEL/ACGIH TLV (mg/m^3)
Anthracene	0.2/0.2
Chrysene	0.2/0.2
Fluorene	none
Phenanthrene	0.2/0.2
Aldrin	0.25 (skin)/0.25 (skin)
delta-BHC	0.5 (skin)/ 0.5 (skin)
Heptachlor	0.5 (skin)/0.5 (skin)
Methoxychlor	15 (total dust)/10
Boron (oxide)	15 (total dust)/10
Selenium	0.2/0.2

Exposure to constituents in the fly ash will be controlled through dust suppression measures. Table 4 identifies the maximum concentrations of individual constituents detected on the Lowry site and the airborne concentration of soil needed to reach the OSHA PEL. The airborne dust levels identified in Table 4 are significant and would impair visibility at a close range.

TABLE 4: HAZARDOUS CONCENTRATIONS OF AIRBORNE DUST

Constituent	Maximum Concentration (mg/kg in soil)	Airborne Dust Concentration at PEL
Anthracene	0.2	>1,000
Chrysene	0.45	>1,000
Phenanthrene	1.0	>1,000
Aldrin	0.00029	>1,000
delta-BHC	0.00048	>1,000
Heptachlor	0.0017	>1,000
Methoxychlor	0.002	>1,000
Boron (oxide)	91.5	>1,000
Selenium	2.9	>1,000

4.5 Polychlorinated Biphenyls - Hazards and Controls

PCBs may be present on the Lowry site in soil and groundwater (solubility is approximately 70 ppb) in isolated locations. PCBs were also identified in concrete rubble and a grease trap associated with Building 402. Health effects associated with exposure to PCBs include eye irritation, chloracne, liver damage and reproductive effects. PCBs have a very low vapor pressure, but can volatilize. Exposure routes include inhalation, ingestion and skin contact. Contaminated soil can be inhaled or ingested as airborne dust. Exposure levels will be maintained below OSHA PELs as shown in Table 5.

TABLE 5: PCB EXPOSURE LIMITS

Constituent	OSHA PEL ACGIH TLV mg/m^3
Chlorodiphenyl (42% chlorine)	1 (skin)/1 (skin)
Chlorodiphenyl (54% chlorine)	0.5 (skin)/0.5 (skin)

Generation of airborne dust during excavation or other invasive ground activities in areas where PCBs have been identified will be controlled through dust suppression measures. Neoprene, butyl rubber or Viton gloves will be worn for sampling tasks.

4.6 Friable and Non-friable Asbestos – Hazards and Controls

Asbestos has been identified on the Lowry site primarily from building demolition and the resulting debris. Friable and non-friable asbestos has been found during excavation or other soil preparation tasks. Asbestos exposure is associated with lung disease including asbestosis, mesothelioma, and lung cancer. Asbestos can also irritate the eyes.

Generation of airborne dust during excavation or other invasive ground activities in areas where asbestos has been identified will be controlled through dust suppression measures. Non-friable asbestos, when identified during these tasks, will be collected and disposed of in accordance with State requirements. Friable asbestos will be abated in accordance with the Asbestos Soil Characterization and Management Plan and applicable Colorado standards. Air

monitoring will be conducted around the perimeter of tasks where friable asbestos has been identified. Latex or nitrile gloves will be worn for sampling tasks.

4.7 Metals

Lead and mercury have been identified in isolated locations on the Lowry site. Lead has been detected in soil samples at the former Outdoor Firing Range. Mercury has been encountered in buildings housing former dental clinics. Significant abatement and subsequent sampling of mercury has been completed.

Exposure to lead can affect the gastrointestinal system, blood, CNS and neuromuscular system. Exposure can be controlled through dust suppression techniques. The OSHA PEL for elemental lead is 0.05 mg/m^3. Dust will be controlled during all excavation or other ground invasive activities to prevent exposure by this route.

Mercury can be absorbed through the skin, inhaled or ingested. Target organs include the kidneys, CNS and respiratory system. OSHA publishes a ceiling PEL for mercury of 0.1 mg/m^3 and specifies that an employee's exposure cannot exceed this limit.

Although the vapor pressure of mercury is low, it can volatilize. Volatilization is a function of temperature. Volatilization can be minimized by keeping the temperature in controlled abatement areas as low as possible. Volatilized mercury can be monitored on a real time basis with a mercury vapor analyzer or with colorimetric tubes and will be monitored as warranted.

4.8 Radiological Hazards

Extensive sampling and monitoring has been completed on the site to identify and characterize radiological hazards. There have been no radiological hazards identified on the site. Measured levels are associated with naturally occurring isotopes for Colorado and not with former usage or activities on the site.

4.9 Unexploded Ordnance/Weapons

IRG employees are not responsible for weapons or UXO hazards. UXO will be handled by a specialty contractor to LAC or by the Air Force, depending where they are found. All suspect nuclear, biological, chemical or other weapons will be handled directly by the Air Force. Contact information is provided in Section 10.0.

4.10 General Site Hazards and Controls

Numerous physical hazards may be present on site. Sound safety practices will be used to prevent injuries to site personnel. General hazards include slips, trips, falls, cuts, and abrasions. Mechanical hazards include entrapment or being struck by moving parts of heavy equipment or falling objects. Adequate distances will be maintained between personnel and rotating or moving mechanical equipment. Work areas will be maintained clean and free of debris that could cause slips, trips or falls including hoses and electrical cords.

Electrical hazards include contact with power lines during excavation or drilling activities. A minimum of at least 20 feet clearance will be maintained between drilling equipment and

overhead power lines. All equipment will be properly locked and/or tagged out when required by the Energy Lockout/Tagout Program.

Traffic cones and/or barricades will be used to maintain safe distances between vehicular traffic and work locations. Employees will wear orange traffic safety vests when work locations close to moving vehicular traffic cannot be avoided.

Colorado One-Call (1-800-922-1987) will be contacted and informed of scheduled field activities at least 48 hours prior to any drilling. The locator company will identify all underground utilities (e.g., electrical, gas, sewer, water, telephone, cable TV) that are present in the work area and notify their respective owners. Probing to a depth of 5 feet will be done where feasible to ensure no utilities, lines or tanks are in the way prior to drilling or excavating activities.

Heat stress precautions will be followed by IRG personnel when working during period of high ambient temperatures (especially in conjunction with high humidity). Adequate cool water and/or electrolyte-replacement beverages (e.g., Gatorade) should be available on site. Employees will be instructed to take frequent breaks out of direct sunlight and to remove protective clothing during breaks. The frequency of rest breaks will be increased if the resting pulse does not return to normal during the break period. Work schedules will be altered so that work may be conducted during cooler parts of the day (i.e., early morning or evening) when possible.

Symptoms of heat exhaustion and heat stress include:

- heavy sweating or complete cessation of sweating,
- changes in skin color,
- increased respiration,
- vision problems,
- dizziness,
- confusion,
- nausea,
- body temperatures in excess of 100°F, and
- increased heart rate.

Personnel exhibiting these symptoms will be removed immediately from the area and observed while resting in a shaded area. Impervious or restrictive clothing will be removed and the individual will be instructed to drink cool water or electrolyte-replacement fluid. Medical attention will be sought if symptoms persist.

The following hypothermia precautions will be followed when working in cold temperatures:

- Work breaks will be taken in a wind-sheltered area.
- Removable layers of insulated clothing will be worn to prevent sweating.
- Water-proof gear will be used when needed.
- Warm fluids will be available for drinking.

- Workers will be monitored for signs of shivering, incoordination, or confusion. Workers exhibiting these signs will be removed from the work area and allowed to warm up in a heated warming shelter.

Frost-bite (superficial or deep tissue) can occur on any exposed skin at temperatures of 30.2°F or colder. Employees will be instructed to wear adequate clothing to prevent hypothermia or frostbite (which can occur on any exposed skin).

5.0 TRAINING REQUIREMENTS

All IRG employees working on the Lowry Redevelopment site with field responsibilities and that may be exposed to potentially hazardous chemicals during the course of their work will be adequately trained. Training will meet the requirements of 29 CFR 1910.120 including the OSHA 40-hour HAZWOPER course and annual refresher training. The Project Manager and Oversight Coordinator training will also include the 1910.120 Supervisor course. The Oversight Coordinator will be current in CPR/First Aid.

Prior to working on the Lowry site, IRG field employees will read the site HASP and participate in a safety briefing that addresses the following:

- Job responsibilities,
- Anticipated hazards,
- Required training,
- Emergency response procedures,
- Route to hospital,
- Availability and location of emergency equipment such as first aid kit, eye wash, and fire extinguishers,
- Access control points when relevant, and
- Proper use and location of PPE.

IRG field personnel will participate in contractor tailgate safety meetings as follows:

- Conditions warrant air monitoring, and
- Hazards are suspected based on historical information.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment will consist of Level D protection for most tasks. For any task requiring respiratory protection, a separate Job Safety Analysis will be written. When accessing construction areas, personal protective equipment will include steel-toed work shoes/boots, cotton coveralls or long-sleeved shirts and long pants, and eye protection. A hard hat, hearing protection, and gloves will be used as needed. Hard hats will be required in construction areas or for any task with overhead hazards. Hearing protection will be utilized as follows:

TABLE 6: HEARING PROTECTION ACTION LEVELS

Noise Level	Protection
< 85 dBA	Wear hearing protection when it is necessary to raise voice to be heard at distance of 3 feet.
85 - 90 dBA	**Hearing protection required.** Install warning signs for fixed noise sources. Employer must have Hearing Conservation Program when employee noise exposures equal or exceed an 8-hour TWA of 85 dBA.
> 90 dBA	**Hearing protection required.**

If monitoring equipment or site conditions indicate the need to upgrade the level of protection to Level C, air-purifying respirators with organic vapor canisters (or other appropriate cartridges), Tyvek coveralls, Viton or other appropriate gloves, and disposable boot covers will be donned. This information will be specified in the written Job Safety Analysis.

7.0 MEDICAL SURVEILLANCE

OSHA requires that "all employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year or all employees who wear a respirator for 30 days or more a year" participate in a medical surveillance program. There are also other substance-specific OSHA standards (e.g., benzene) that require medical surveillance. None of these criteria are anticipated on the Lowry site. Employees will not participate in a medical surveillance program unless conditions change warranting a modification to the program.

Medical (emergency, hearing, etc.) and exposure monitoring records will be maintained in accordance with applicable standards. Employees and their representatives can access their records in accordance to 29 CFR 1910.1020.

8.0 AIR MONITORING

Air monitoring will be used to ensure that exposures to airborne hazards are identified and controlled. Air surveys will also be conducted to identify hazardous atmospheres such as those with insufficient oxygen or flammable vapors. Air monitoring is required when the potential for an exposure or hazardous atmosphere exists. Historical site characterization data will be evaluated to identify potential hazards in specific areas. Work areas with potentially hazardous atmospheres will be cordoned off and access to the area will be restricted.

Monitoring equipment will be maintained and calibrated in accordance with manufacturer's recommendations. Personnel utilizing the monitoring equipment will be adequately trained in the proper calibration and use of the instruments and in the accurate interpretation of monitoring results.

8.1 Organic Vapors

Organic vapor surveys will be conducted with a photoionization or flame ionization detector (PID or FID). The PID will be equipped with a 10.6 or 11.7 eV lamp. The 10.6 eV lamp is

adequate for many organic vapors including most petroleum constituents. However, most chlorinated solvents require the use of either an FID or PID equipped with an 11.7 eV lamp. For air monitoring tasks where chlorinated solvents are suspected, the 11.7 eV lamp will be used.

Colorimetric tubes will be utilized to identify suspected contaminants when elevated readings persist on the PID or FID. Benzene tubes will be utilized when petroleum is suspected or contaminants are unknown. Perchloroethylene tubes will be used to screen for chlorinated solvents. Colorimetric tubes or a real-time monitor will be used when mercury is suspected. Additional tubes will be utilized if other specific contaminants are identified through characterization data or historical records.

Survey instruments will be used to determine the source of the airborne hazard and to protect workers from exposure. Sources will be identified by monitoring close to suspected locations such as contaminated soil or water. Monitoring will be conducted upwind to identify background concentrations. Worker exposure levels will be assessed by evaluating contaminant concentrations in the breathing zone.

8.2 Airborne Dust

Generation of airborne dust will be controlled below visible levels through dust suppression techniques such as water spray. Data presented in Table 4 indicates that significant levels of airborne dust would have to be generated to reach published exposure levels for specific constituents. Routine dust monitoring is not warranted based on identified contaminant levels. Specific locations may warrant monitoring based on characterization data and will be determined by the Oversight Coordinator.

8.3 Combustible Gases

Explosive gases will be evaluated with a combustible gas indicator. Tasks warranting combustible gas monitoring include drilling, monitoring well installation, and container/tank sampling. The action level for combustible gases is 10% of the lower explosive limit. If combustible gases at concentrations greater than the action level are identified, work will stop until the concentration dissipates through natural or forced ventilation.

8.4 General Considerations

All instruments will be calibrated in accordance with manufacturer's recommendations and prior to starting work. Calibration information will be recorded in the logbook. Weather conditions will also be noted. Background readings will be taken upwind of the work area. Sources contributing to the airborne contaminant level will be identified.

Exposures will be maintained below published exposure levels through the use of air monitoring and adequate controls. The action levels specified in Table 7 were developed for use during excavating, trenching, or other invasive ground work. The use of air monitoring instrumentation and specified action levels will be used when airborne hazards are present or suspected. If contaminants can not be adequately characterized in the field, work will stop until airborne levels return to background or additional characterization data is obtained.

TABLE 7: ACTION LEVELS FOR AIR MONITORING INSTRUMENTATION

Instrument	Breathing Zone Reading	Action Taken
PID or FID for VOCs	Background – 2.5 ppm	**Level D** work may continue.
	2.5 - 10 ppm	Collect benzene detector tubes if petroleum is suspected.
	10 - 500 ppm	**Leave area.** Contact Project Manager if contaminant levels do not dissipate. Don air-purifying respirator with organic vapor canisters in accordance with Job Safety Analysis.
Benzene Colorimetric Detector Tubes	0 – 0.5 ppm	**Level D.** Work may continue.
	0.5 - 10 ppm	**Leave area.** Contact Project Manager. Don air-purifying respirator with organic vapor canisters in accordance with Job Safety Analysis.
Perchloroethylene Colorimetric Detector Tubes (other halogenated hydrocarbons will give a response on tube)	0 - 5 ppm	**Level D.** Work may continue.
	> 5 ppm	**Leave area.** Contact Project Manager.
Combustible Gas Meter	<10% of LEL	**Continue working.** Evaluate exposure levels to determine adequate respiratory protection.
	>10% of LEL	**Stop work and evacuate.** Eliminate all ignition sources and increase monitoring frequency. Ventilate work area.

Sampling of closed tanks or containers presents a unique hazard; contents may be under pressure presenting an increased inhalation risk. Containers and tanks will be evaluated to determine whether characterization data exists. If the contents of a container are unknown, a Job Safety Analysis will be written to ensure that adequate safety controls are utilized for sampling.

Confined spaces also present a unique hazard that must be evaluated on a case-by-case basis. Entry into permit required confined spaces, as defined by OSHA, are not anticipated on this site. If identified, confined spaces will be adequately assessed prior to entry for hazardous atmospheres including toxic gases, combustibles gases and oxygen deficiency. A permit system will be used for any space meeting the criteria established by OSHA in 29 CFR 1910.146.

A separate air sampling program has been developed for airborne asbestos sampling. Asbestos sampling criteria and action levels are included in the Asbestos Soil Characterization and Management Plan (Appendix of Soil Management Plan).

9.0 DECONTAMINATION

Decontamination areas will be established for equipment and personnel by contractors when warranted. IRG personnel will comply with work zones requirements when established by contractors in designated work areas.

Disposable boot covers, when used in areas where asbestos or other contaminants are present in the soil, will be disposed of with other contaminated debris when leaving the work area. Dirt or mud from construction sites will be removed from boots prior to leaving the site.

10.0 EMERGENCY RESPONSE

Site emergencies are unexpected, sudden events that present an immediate threat to site personnel, the public or the immediate environment. Potential emergency situations include those associated with residential or commercial areas including fires, vehicle accidents, injuries, and weather incidents. In addition, significant construction is ongoing and in various stages of completion; hazards exist due to heavy equipment operation and working in close proximity to overhead power lines or buried utilities.

10.1 Emergency Reporting

Any IRG employee identifying an emergency situation will immediately notify management personnel by contacting the site office. Immediate assistance will be requested as warranted via the 911 system for fire, medical, or police. Affected areas will be evacuated as warranted with the assistance of site personnel and emergency responders. Access into affected areas will be controlled to minimize risks. Immediate action is critical for minimizing the spread of the hazard or risk to the affected population.

When reporting an emergency, the following information should be conveyed to emergency responders:

- Name and number of person reporting incident,
- Location of incident,
- Nature of incident (fire, spill, medical emergency),
- Number of people involved,
- Hazardous material involved,
- Risk to surrounding population,
- Movement and direction of released materials,
- Quantity of hazardous materials involved,
- Controls and emergency measures currently implemented, and
- Other pertinent information or as requested.

10.2 Fire and Spill Response

Emergency fire fighting services are available through Denver Fire Station 14, District 5 located at 1426 Oneida Street, Denver. Fire extinguishers are located in subcontractor trailers, company vehicles and mounted on heavy equipment. In the event of a fire or explosion, evacuate the site

immediately and call for emergency assistance. In case of a spill, contain with clean dirt, if possible, and call the local fire department or hazardous materials response (HAZMAT) unit.

10.3 Medical Assistance

Hospitals in the immediate vicinity include:

THE MEDICAL CENTER OF AURORA

The Medical Center of Aurora North 700 Potomac Street Aurora, CO 80011 Telephone: (303) 695-2600 (near I-225 and 6th Ave.)	The Medical Center of Aurora 1501 S Potomac Street Denver, CO 80012 Telephone: (303) 695-2600 (near I-225 and Mississippi)

UNIVERSITY HOSPITAL

Fitzsimmons Campus Colfax and Ursula Aurora, CO 303-372-0000	9th & Colorado Campus 4200 E. Ninth Ave Denver, CO 303-372-0000

Maps to these facilities are included in Appendix B. Emergency medical services will be contacted via the 911 system.

10.4 Ordnance Response

Nuclear, biological and chemical UXO are the responsibility of the Air Force. Notify LAC management immediately, if any of these materials are suspected or identified. LAC will contact the Air Force representative, Paul Carroll at (806) 885-5010 or (806) 438-1429 (cell) to report the suspected material.

10.5 Emergency Equipment

A standard first aid kit and a portable eye wash is available in the LAC offices located in Building 667 at 765 Uinta Way and in the Oversight Coordinator's vehicle. These items are also available in subcontractor trailers and company vehicles. Supplies in the first aid kit are available for use in case of minor injuries.

10.6 Communication

Communication will be maintained between the site office and the Oversight Coordinator via a cell phone. Site and emergency numbers are as follows:

Program Manager, Joe Aiken	(303) 972-6633
Project Manager, Elizabeth Sopher	(303) 326-7103
Oversight Coordinator	
Site Office	
Fire	911
Ambulance	911
Police	911

APPENDIX A
FORMS

SITE HEALTH AND SAFETY PLAN REVIEW RECORD

I have read and understood the contents of this Site Health and Safety Plan and I agree to abide by all provisions specified within.

Signature	Date

VISITOR STE HEALTH AND SAFETY PLAN REVIEW RECORD

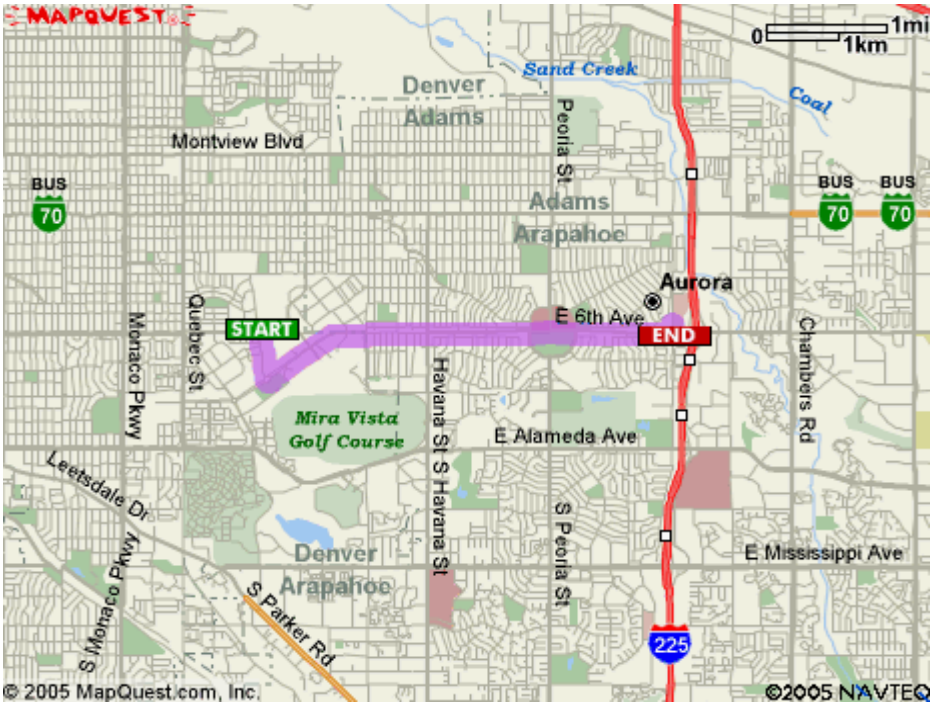
I have read the Site Health and Safety Plan and have discussed the nature of contaminants and the types of hazards present on the site with the Oversight Coordinator. I am aware of the levels of chemical exposures that could occur and will abide by the control procedures established in the plan.

Name	Signature	Affiliation	Date

APPENDIX B
ROUTES TO AREA HOSPITALS

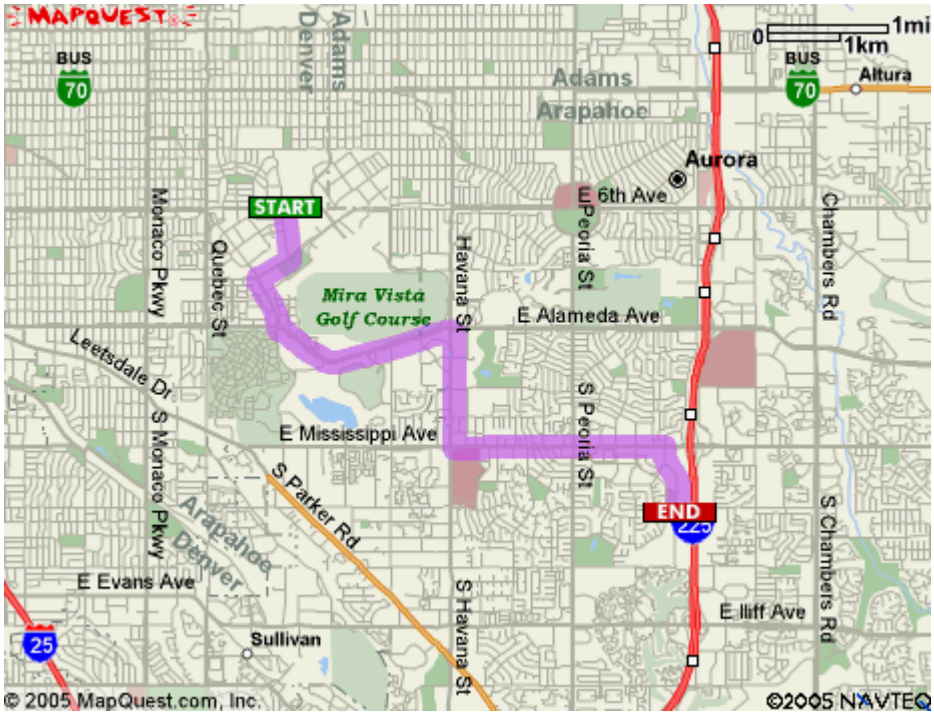
The Medical Center of Aurora North
700 Potomac Street
Aurora, CO 80011
Telephone: (303) 695-2600
(near I-225 and 6th Ave.)

Directions: East on East 6th Avenue for approximately 2.5 miles, North on Potomac for less than 0.5 miles.



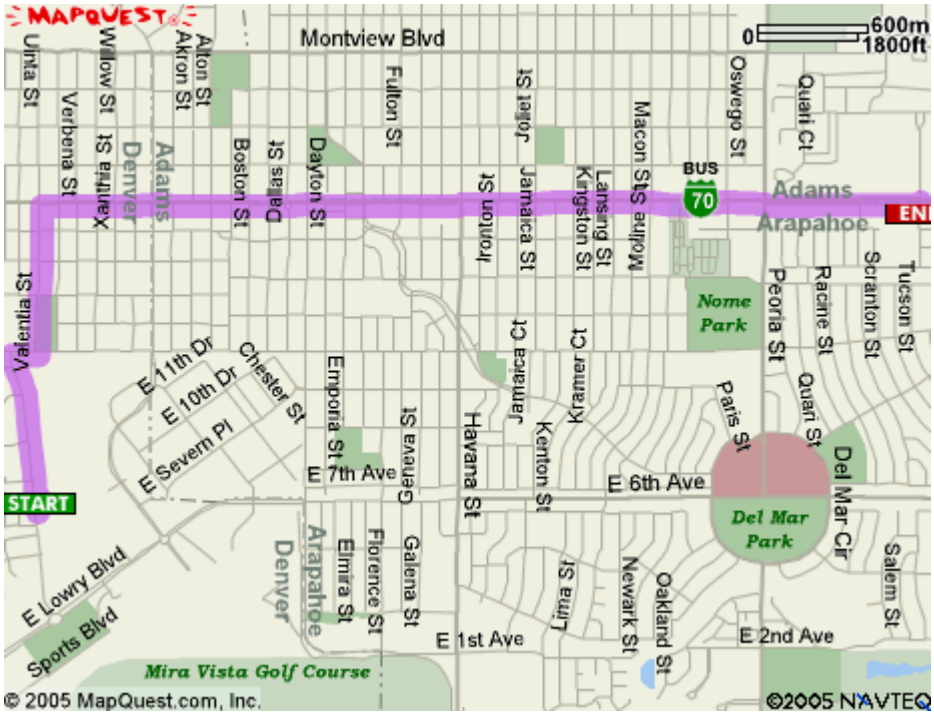
The Medical Center of Aurora
1501 S Potomac Street
Denver, CO 80012
Telephone: (303) 695-2600
(near I-225 and Mississippi

Directions: East on East Alameda Ave for 1.5 miles, South on South Havana St for 1mile, East on East Mississippi Ave for 1.7 miles, South on South Potomac for less than 0.5 miles.



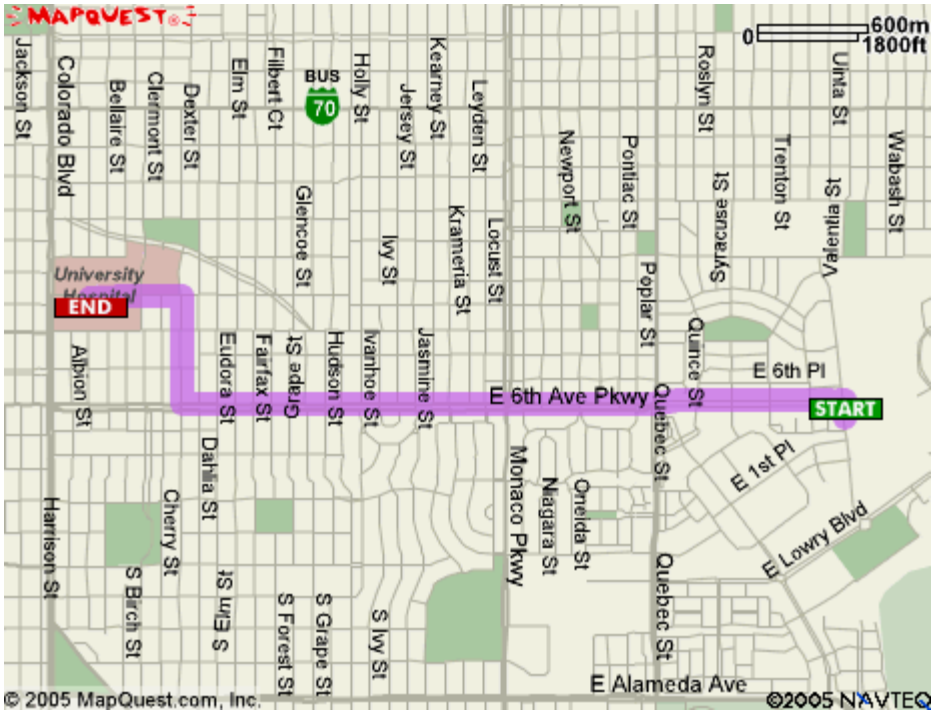
UNIVERSITY HOSPITAL
Fitzsimmons Campus
Colfax and Ursula
Aurora, CO
303-372-0000

Directions: East on Colfax Ave for 2.8 miles.



UNIVERSITY HOSPITAL
9th & Colorado Campus
4200 E. Ninth Ave
Denver, CO
303-372-0000

Directions: West on 6th Ave for 2.2 miles, North on Dexter St for 0.3 miles, West on East 9th Ave for 0.2 miles.



MATERIALS MANAGEMENT PLAN

This document presents the Materials Management Plan (MMP) for the excavation activities at the former Lowry landfill (Site) for the purpose of redevelopment by International Risk Group, LLC, Industrial Realty Group, and Bear Creek Capital. The Site consists of the former Lowry OU2 landfill site that was used for Air Force base wide municipal solid waste (MSW) from approximately 1949 to 1989. The Site is depicted on Figure 1. The goal of this plan is to provide a safe, suitable environment for the redevelopment of the Site. The major activities contemplated in this plan include excavation and off-site disposal of MSW.

This Plan is being prepared for submittal to the Colorado Department of Public Health and Environment (CDPHE) to obtain regulatory concurrence on the principal methods of soils and other materials handling. When finalized, the Plan will be provided to all contractors working at the Site and other development partners.

The purpose of this MMP is to provide comprehensive, but flexible, procedures for managing the removal and disposal of municipal waste and other materials that may be reasonably expected to be encountered during excavation and redevelopment activities. When finalized, this MMP will be provided to all contractors working at the Site.

This MMP has been designed to include the following activities:

- Pre-design Investigations
- Surface water management
- Soil and waste excavation and management
- Special waste handling

The MMP is organized as follows:

- Section A provides a historical background of the Site
- Section B identifies the various parties conducting work at the Site and the responsibilities of these parties
- Section C discusses pre-design investigations
- Section C discusses surface water management
- Section D discusses soil and waste excavation and management
- Section E addresses special waste handling
- Section F identifies procedures for addressing Potentially Contaminated (non-MSW) soils and waste

A. BACKGROUND

The Site consists of the former Lowry OU2 landfill site that was used for Air Force base wide municipal trash from approximately 1949 to 1989. The Site is depicted on Figure 1.

The 70 acre Site is located on Alameda Avenue, east of Fairmount Drive, in Denver, Colorado.

Lowry Assumption, LLC (LAC) closed the Lowry Air Force Base landfill in accordance with State and Federal regulations in 2004 and is currently responsible for the long-term monitoring and maintenance.

Historical information concerning the Site has been documented in several previous studies (see references); including the Phase II Corrective Action Plan, the Focused Feasibility Study, the Supplemental RI, the Proposed Plan, and the Finding of Suitability for Early Transfer. (list others from flyer).

B. ROLE AND RESPONSIBILITIES OF THE KEY PARTIES

CDPHE – Lead regulatory agency

City and County of Denver – regulatory oversight

IRG Redevelopment I, LLC –Owner

Bear Creek Capital – Owner

Industrial Realty Group, LLC - Owner

U.S Air Force – former Site owner

C. PRE-DESIGN INVESTIGATIONS

As a part of the design investigations, geotechnical borings will be placed at numerous locations within the former landfill. It is anticipated that these borings will be installed during numerous studies over the next few years. Some of the studies will be focused on generalized geotechnical information on the entire fill, including the waste mass in trenches, and some of the studies will be specifically focused on different parcels within the overall landfill zone.

Test boreholes will be drilled at locations to evaluate the subsurface profile including depths to bedrock and groundwater, and to perhaps obtain samples for laboratory testing for geotechnical purposes. The test holes will be drilled to depths of 15 to 30 feet (or practical rig refusal) across the subject parcel, away from the areas underlain by waste disposal trenches. The final test hole depths will be determined in the field, however, as the subsurface profile becomes evident.

Test boreholes will be drilled at locations to assist delineating the locations and extents of the waste trenches beneath the site. These test holes will be advanced to depths of 15 to 20 feet. Samples will be collected from the test holes to evaluate relevant engineering characteristics of on-site materials. The results will be used to develop geotechnical

recommendations for appropriate foundation and floor system types, project earthworks and utility installation, and preliminary pavement sections.

All boreholes will be continuously sampled and logged for lithology. Information that shall be recorded on the Lithologic Log includes the borehole location; drilling information; sampling information such as sample intervals, recovery, and blow counts (if applicable); waste material encountered, and sample description information. A measurement of the sample with a photo-ionizing detector (PID) will be collected every two feet. Lithologic descriptions of unconsolidated materials encountered in the boreholes will generally be described in accordance with American Society for Testing & Materials (ASTM) D-2488-90 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM, 1990). Descriptive information to be recorded in the field shall include:

- Identification of the predominant particles size and range of particle sizes;
- Percent of gravel, sand, fines, or all three;
- Description of grading and sorting of coarse particles;
- Particle angularity and shape;
- Maximum particle size or dimension;
- Plasticity of fines;
- Color (using Munsell Color System);
- Moisture (dry, wet, or moist);
- Consistency of fine grained soils;
- Structure of consolidated materials;
- Cementation (weak, moderate, or strong); and
- Identification of the Unified Soil Classification System group symbol.

Additional information to be recorded includes the depth to the water table, caving or sloughing of the borehole, nature and extent of waste material encountered, changes in drilling rate, depths of samples, presence of organic materials, presence of fractures or voids in consolidated materials, and other noteworthy observations or conditions, such as the locations of geologic boundaries.

Investigation-Derived Waste (IDW) Handling

IDW drill cuttings shall be placed either into 55-gallon drums or rolloff by the drilling contractor. Drill cuttings shall be segregated based on saturated and dry cuttings with saturated cuttings containerized and dry cuttings spread out on the ground surface. Each drum shall be filled to 90-percent of capacity and sealed with a compatible lid. IDW decontamination water will be placed into 55-gallon drums. All IDW will be properly characterized for appropriate disposal.

All IDW will be properly manifested according to the IDW characterization results and properly disposed of at the appropriate disposal facility.

Borehole Abandonment

Total borehole depth and depth to static water (if encountered) will be measured at each borehole prior to abandonment. Wells will be abandoned by filling the borehole with bentonite chips. The bentonite chips shall be hydrated with potable water poured directly down the borehole. The top five feet of the hole shall be filled with materials less permeable than the surrounding soils.

3.2 Exploratory Test Pits

Exploratory test pits may also be utilized with geotechnical borings to determine the subsurface characteristics of the site. Again, these test pits may be placed at numerous locations within the former landfill and it is anticipated that these borings will be installed during numerous studies over the next few years.

Test pits will be advanced using a trackhoe perpendicular to and along the periphery of the trenches identified in the aerial photographs. Test pit explorations will be advanced to define the nature and extent of waste material. Near-surface soils will be segregated in order to restore the cap to design specifications. Each test pit will be logged by a field geologist and the location documented using GPS. The field geologist/engineer will log soils to identify where landfilling has occurred. Native soil deposits have a greater density than disturbed or fill soils, and disturbed (previously excavated) areas are readily apparent during excavation. In order to evaluate potential soil quality impacts associated with the disposal trench the field geologist will log excavated soil based on visual evidence of debris/contamination.

If no visually impacted materials are observed in a portion of a test pit, that portion will be backfilled compacted to within two feet below original grade. The remaining test pit will be backfilled with the excavated material and the cap restored to the design specifications.

If visually impacted materials are encountered during trenching, the waste will be handled under the Materials Management Plan for characterization, excavation, and or disposal. Waste soils will be segregated and placed on 6 mil poly or in a lined roll-off container. Additional excavation will not be conducted if buried drums or hazardous materials are encountered. The occurrence will be documented, staked, and located using GPS. Soils containing visually impacted materials removed from a test pit will be stockpiled in accordance with the provisions of Material Management Plan (e.g., segregated; placed on poly; sampled, if required for disposal; covered with poly to minimize exposure to rain or wind). The test pit will not be widened to remove additional materials during this exploratory phase.

Once the material has been properly backfilled the remaining trench will be backfilled with the original surface excavated material and the cap restored to the design specifications.

Excavations performed as part of this work will also generally be sloped at 1H:1V or as directed by the field supervisor. The Project Manager or site contractor may modify this requirement if greater protection is required based on site conditions. During all excavation activities, protection monitoring will be performed.

3.4 Exploratory Trenching

On an as-needed basis, the developer may choose to install larger test pits or cut trenches through the waste materials and soils at the site to characterize the materials that may be encountered during development-related excavations. It is the intention of Lowry Vista to excavate these trenches and to exhume waste for visual characterization only. Any waste that is excavated from burial trenches will be segregated for characterization or placed back into the exploratory trench and the cap restored to design specifications. Lowry Vista will assure that mitigation measures are in place and follow the Materials Management Plan for the handling of all waste material.

Exploratory trenching may be performed along the boundaries of the landfill area to identify and evaluate the vertical and lateral characteristics and the nature of the waste material in the disposal trenches identified on the aerial photographs. Trenches will be advanced using a trackhoe perpendicular to and along the periphery of the trenches identified in the aerial photographs. If waste is encountered, then the trench will be extended until a 20-footlength of trench is observed to not contain buried waste material. Cap/overburden material will be segregated from any potential waste material in order to re-use this material for backfill and to minimize potential waste for offsite disposal.

Each trench will be logged by a field geologist/engineer and the location documented using GPS. The onsite geologist will log native soils and identify where landfilling has occurred. In order to evaluate potential soil quality impacts associated with the disposal trench the field geologist will log excavated soil based on visual evidence of debris/contamination. Native soil deposits have a greater density than disturbed or fill soils, and disturbed (previously excavated) areas are readily apparent during excavation. Therefore, in areas where only undisturbed native soils are encountered, the trenches will be advanced to ensure that landfilling had not occurred in the area. In areas where debris and/or disturbed soils are encountered, the trenches will be excavated in order to delineate the physical (vertical and horizontal) characteristics of the disposal trench. If no visually impacted materials are observed in a portion of a trench, that portion will be backfilled compacted to within two feet below original grade. The remaining trench will be backfilled with the original surface excavated material and the cap restored to the design specifications.

If visually impacted materials are encountered during trenching, the waste will be handled under the Materials Management Plan for characterization, excavation, and/or disposal. Waste soils will be segregated placed on 6 mil poly or in a lined roll-off container. Additional trenching will not be conducted if buried drums or hazardous materials are encountered. The occurrence will be documented, staked, and located using

GPS. Soils containing visually impacted materials removed from a trench will be stockpiled in accordance with the provisions of Material Management Plan (e.g., segregated, placed on poly, sampled, covered with poly to minimize exposure to rain or wind) and in accordance with Colorado Hazardous Waste Regulations. The trench will not be widened to remove additional materials during this exploratory phase; it is anticipated that all materials existing within test pits are part of a closed landfill and excavation of these materials is not required. Once the material has been properly backfilled the remaining trench will be backfilled with the original surface excavated material and the cap restored to the design specifications.

Excavations performed as part of this work will also generally be sloped at 1H:1V or as directed by the field supervisor. The Project Manager or site contractor may modify this requirement if greater protection is required based on site conditions. During all excavation activities, protection monitoring will be performed.

Discovery and Handling of Visually Impacted Materials

In the event that visually impacted materials are encountered, site personnel will proceed as follows:

1. Notify the Environmental Project Manager. A written description and a sketch of the location of the material will be documented in the field notebook.

2. Based on recommendations from the Environmental Project Manager and the contractor, and based on the type of material encountered, appropriate equipment will be used during removal of these materials.

3. Visually impacted materials will be removed with care taken to avoid spreading the contamination into an uncontaminated area.

4. The removed materials will be segregated and stockpiled separately from contaminated and uncontaminated soils. The stockpiled materials will be designated for appropriate disposition as discussed in the Materials Management Plan or replaced into the trench and covered.

Stockpiles

Excavated impacted soil will be placed in temporary stockpiles adjacent to the exploratory trenches. Clean overburden removed from the excavations will be placed in the clean stockpile area. Stockpiles will be constructed to protect stored material from erosion by wind and rain. Contaminated soils and visually impacted materials will be stored on a 10-mil nominal thickness impermeable polyethylene liner for short-term storage (less than 90 days) and will be covered with a polyethylene liner (minimum 6-mil thickness). Berms will be constructed surrounding contaminated soil and visually impacted material stockpiles to contain any leachate. The top liner will be weighted down with a series of ropes/sandbags or netting to prevent uncovering from wind.

Construction and placement of these liners will be such that surface water runoff and rain do not come in contact with the contaminated soils/materials. Any stockpiles left in place will be inspected and maintained regularly to ensure the cover and bottom liner material remain intact and that any liquid leachate is contained in the leachate collection system described in the next subsection. Stockpiles will be placed in an area that has been graded smooth. All material that may puncture the liner, including large rocks, branches, or metal debris will be removed prior to placement of the stockpile liner. Where necessary, the area will be graded to ensure that water drains to the collection sump described in the next subsection.

Leachate Collection

It is not anticipated that stockpiled soils will generate liquids. However, if unexpectedly wet soils are encountered, contaminated soil stockpiles will be constructed to drain generated liquids (primarily water that leaches out of excavated soil) to a common sump. The sump will be excavated from the ground surface, lined with polyethylene, and have a layer of clean gravel placed in the bottom to hold it in place. A berm will be constructed around the sump to prevent inflow from sources other than impacted soil leachate. Liquid in the sump (if present) will be pumped into a chemically compatible container. The contractor will minimize generation of wastewater through best management practices, including diverting runoff outside the stockpile areas and draining the rain falling on the stockpile covers outside the drain collection area. Water draining from the clean overburden stockpiles will be directed away from the sump that collects water from the impacted soil stockpiles. Accumulated liquids will be disposed of at off-site disposal facility.

Soil Containers

Soil destined for off-site disposal will be placed in lined, transportable containers that will be kept in the designated stockpile area. After soil has been placed in the containers and sampled for waste designation in accordance with disposal facility requirements, the containers will be covered and secured. The condition of the containers and soil will be determined during weekly inspections. Containers will be managed as if they were hazardous waste, but labeled “Pending Analysis” until such time as test results on the corresponding waste designation samples demonstrate that the soil is hazardous or not. Based on analytical results, the container labels will be changed to reflect the waste’s regulatory status as hazardous or non-hazardous.

D. SURFACE WATER MANAGEMENT

Prior to initiating soil and waste excavation, a stormwater permit and Stormwater Management Plan will be developed in accordance with 5 CCR 1002-65. Stormwater management practices during excavation will be based on the following:

- Reserve, low downgradient areas for storm water retention

- Segregate storm water (clean water) from potential leachate (water that has contacted waste) using soil berms
- Allow storm water to discharge into existing drainages.
- Prevent storm water from flooding excavation sites during remediation.

Storm water or leachate controls during waste removal will be sized based on construction duration and the potential damage from exceeding certain storm events. Excavation perimeter control structures are meant to control storm water run-on into excavation areas during waste excavation operations. Prior to commencing excavation activities, a sheet piling or other containment wall will be constructed along the northern boundary of the landfill in the vicinity of the wetlands area and along the eastern boundary of the landfill, adjacent to Westerly Creek. To minimize the impact of run-on to excavation areas, diversion structures (berms and/or channels) will be used to route storm water away from the excavation areas. Storm water management plan design details will be included in the 60% Design Document.

Temporary sediment control structures will be built to control sediment during excavation activities. The structures will be designed and constructed to maintain water quality at Westerly Creek without allowing surface water to pond at the Site. Details pertaining to the construction of temporary detention ponds will be included in the 60% Design Document.

Within each excavation area, berms or other means will be employed to reduce the amount of precipitation that could contact the waste or run-off from the waste faces to areas previously excavated. Run-off/run-on control features will be constructed to limit storm water contact with exposed MSW or excavation areas.

E. SOIL AND WASTE EXCAVATION

This section describes management of the on-Site soils and MSW. Generally speaking, soil, overburden (soil located above the MSW) will be used whenever possible as backfill material within the excavation or as cover for the reconstruction of the Site. MSW will be delivered off-Site for disposal. The MMP provides potential uses or disposal of material encountered. A Construction Plan of Operations (CPO) will be developed to identify how the material will be managed. The specific requirements of the CPO are described below. The CPO will detail the how the requirements of this SMP are to be implemented in the field, identifying means and methods that will be utilized to meet the guidelines established in this Plan. MSW will be removed and excavated in accordance with the final design specifications. Contractors will be required to submit a CPO that addresses the following:

- Proposed excavation and hauling equipment
- Excavation sequencing and traffic patterns, including haul road locations and sequencing;
- Waste screening and special handling procedures;
- Location and details of proposed waste handling and storage facilities

- Waste manifest forms to be used
- Equipment decontamination procedures;
- All required permits;
- Proposed methods for possible drum removal;
- Storm water management plan, including design details pertaining to storm water detention and water quality swale construction.

The CPO will also address: 1) methods to allow excavation equipment to work from areas containing waste, while minimizing the tracking of waste into clean areas; 2) methods for providing access into excavations; 3) routing of haul vehicles (for waste and clean backfill) to minimize contact with waste and other areas not considered clean; 4) the proposed construction schedule, including anticipated excavation rates and waste inspection needs; and 5) waste handling and storage areas for potential non-MSW waste.

1. Soil Excavation

The former Lowry landfill is covered with an 18-inch low permeability layer followed by a 6-inch vegetative layer. Cover material will be excavated and stockpiled for later use as fill material on Site. The excavation process would consist of excavation then backfill of one small area at a time. Excavation in each area would start with the removal of unsaturated soil and refuse. Groundwater encountered would be handled in accordance with Section D, subpart 5 of this MMP.

2. Waste Excavation, Inspection and Characterization

The locations of MSW that are expected to be encountered are identified within the former trench locations. The trench locations were identified from aerial photographs dating from 1950 to 1982.

In general, waste confirmation sampling is not expected to be performed as the limits of excavation will be dictated by the redevelopment project objectives and technical specifications, not a numeric clean-up goal. Excavated materials will be screened visually by trained personnel and by using a photoionization detector (PID). Based on PID readings and visual observations, the excavated materials will be segregated as nonhazardous (clean fill or MSW) or potentially hazardous waste/special waste for further characterization and disposal. Excavated waste determined to be clean would be used for backfill. Trained waste inspectors will be present at each active excavation.

Waste that does not require special handling (non hazardous MSW) will be loaded directly into trucks for transportation to a permitted RCRA Subtitle D solid waste disposal facility. MSW must be disposed of at a permitted solid waste disposal facility that meets the standards of 6 CCR 1007-2. Construction and other debris that may encountered in the trench locations (including tires) are not subject to any special handling, packaging or labeling requirements. Excavated, non-hazardous waste not taken directly offsite will be placed in temporary stockpiles on unexcavated portions of the Site and bermed with earthen material. A reinforced synthetic membrane will be placed on

each stockpile, as required, to control odor and particulate emissions. Any drainage from the stockpiled refuse would be contained within the bermed area. Free liquids contained within the bermed areas would be permitted to flow back into the excavation, and the dewatering process (as described in Section 4.7) would extract and treat contaminated liquids, as necessary.

Unless visual inspection dictates that special handling must occur, confirmation sampling will not be conducted following the removal of soil and MSW. However, waste requiring further sampling, will remain stockpiled and covered as described above until the waste has been characterized for disposal. Hazardous waste will be transported to a permitted RCRA Subtitle C hazardous waste treatment or disposal facility.

All wastes shipped for disposal off-site will be profiled in accordance with the requirements of the disposal facility accepting the waste, and in accordance with applicable laws. Transportation equipment used to haul MSW must prevent spillage, leakage, or dispersion.

Transportation of waste identified as nonhazardous would presumably go to Denver-Arapahoe Disposal Site located in Arapahoe County, Colorado, approximately 20 miles east of the Site while transportation of waste identified as hazardous would presumably go to the hazardous waste facility in Last Chance, Colorado, approximately 35 miles east of the Site.

3. Interim Closure of Work Areas

If necessary, to control fugitive dust and odors, inactive work areas may be closed and covered with one or a combination of the following:

- Foam Spray;
- Hydro-mulch spray;
- Crusting agents;
- Reinforced geomembrane;
- A minimum 6-inch loose lift thickness of soil

4. Fugitive Dust and Personal Air Monitoring

In accordance with 5 CCR 1001, fugitive dust will be monitored. A Fugitive Dust Control Plan will be submitted prior to initiating excavation activities in order to secure an Air Pollution Emissions Notice and Application for Construction Permit.

Dust control practices that may be used to control air emissions and provide dust suppression at the Site and neighboring communities may include the following:

- Cover inactive, exposed excavation areas with geomembrane or soil
- Minimize drop heights when dumping materials
- Treat surfaces with water spray

A variety of control and monitoring methods are available. The CPO will describe the monitoring and dust suppression techniques. All material, equipment, and related items for monitoring and control must be in place at the Site prior to the start of any excavation activities.

Air quality monitoring will be performed as described in the Site Health and Safety Plan (HASP). Continuous air monitoring will be conducted during the excavation and removal process to determine appropriate levels of personal protective equipment (PPE) for workers. In addition, air monitoring will be conducted to evaluate air emissions that could affect nearby communities. The air quality monitoring program will utilize real time instruments to provide an indication of airborne exposure concentrations and to allow the workers protection from excessive levels of airborne chemicals. Monitoring for volatile organics and methane gas will be conducted at the downwind edge of each excavation area. Should air monitoring indicate a need to upgrade PPE, workers at the site will upgrade from Level D PPE to Level C or Level B. In addition, Level B protection would be required when handling unknown waste not assumed to be MSW and when visual, PID, or air monitoring readings indicate.

5. Construction Dewatering and Groundwater Treatment and Disposal

If dewatering and off-site treatment and disposal is required, a construction dewatering permit will be obtained. The depth to groundwater beneath the Site ranges from approximately 10 feet bgs near the southern landfill boundary to approximately 20 feet bgs in the north-central portion of the landfill. Based on the anticipated total depth of waste up to 15 feet bgs, it is anticipated that dewatering may be required during a portion of the excavation activities. Groundwater removed from the excavations will likely require temporary storage on-Site until it could be characterized by laboratory analysis to determine appropriate treatment and disposal options.

6. Equipment Decontamination

Prior to excavation and material handling, equipment mobilizing from one excavation area to another, all equipment will be thoroughly decontaminated as to not spread contaminants across the Site. Heavy accumulations of potentially contaminated materials will be removed by scraping with a shovel or similar tool and, where appropriate, by brushing with stiff bristle brushes and brooms.

The CPO to be submitted by the Contractor will describe the proposed equipment decontamination procedures. All trucks leaving the Site will be visually inspected so that they are not causing contamination off-site and to verify all waste has been removed from the haul trucks prior to returning to the Site. Any trucks not meeting the Site standards for decontamination will be sent back.

F. SPECIAL WASTE HANDLING

This section addresses the handling procedures and regulatory requirements for addressing special waste and/or soil that is not identified as SMW. The following subsections describe the categories of waste with may be encountered at the Site.

1. Asbestos

Asbestos disposal is regulated by the CDPHE Hazardous Materials Waste Management Division (HMWMD) as a solid waste (CDPHE 2002a). In addition, 6 CCR 1007-2 requires landfill operators to handle asbestos wastes separately from other wastes. Non-friable asbestos waste is accepted for disposal by many landfills as long as the landfill operator is contacted for approval prior to disposal. The following three Denver-area landfills are authorized to accept friable asbestos waste: *Denver-Arapahoe Disposal Site* at 3500 South Gun Club Road in Aurora (303-690-4303); *Conservation Services Inc*. at 41800 East 88th Ave. in Bennett (303-644-4332); and *Tower Landfill* at 8480 Tower Road in Commerce City (303-371-5115).

If asbestos is encountered during any excavation activities, work activities in the area will immediately cease and the material will be visually inspected. If the material is suspect, samples of the material and surrounding dirt will be submitted for PLM analysis or assumed to be asbestos-containing. Pertinent information regarding the location, type of debris, and quantity will be recorded and photographs taken. Pending results of the material and surrounding soil, work activities will cease and the material will be covered as to prevent a potential release.

Limited Quantity Non-Friable Material Discovery

If the material is deemed positive for asbestos (greater than 1%), is less than a 55-gallon drum (Regulation 8 trigger level), within a 10-foot radius, and not friable, the material will be packaged before being sent to a landfill. No additional surrounding soil is required to be removed. However, prospective disposal facilities should be contacted prior to disposal for any local/facility requirements.

Limited Quantity Friable Material Discovery

If the material is friable, less than a 55-gallon drum, and within a 10-foot radius, it shall be wetted and tightly sealed in a least two 6-mil, leak-tight polyethylene bags or in wrapping or other container deemed equivalent by the HMWMD and be disposed as friable asbestos-containing waste. Remove soils surrounding the friable debris discovery location and dispose of as solid waste. Report discovery of material to CDPHE.

The outermost layer of the packaging must be labeled with a waste shipment manifest label that gives the name and address of the generator of the waste and either of the following statements in letters at least 0.5 inches tall:

CAUTION
Contains Asbestos

Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous to Your Health

or

DANGER
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard

Significant Quantity Non-Friable Material Discovery

Where non-friable material is identified, is greater than a 55 gallon drum, or greater than a 10 foot radius, the material will be packaged before being sent to a landfill.

Significant Quantity Friable Material Discovery

Where friable debris is identified and is greater than a 55-gallon drum, a remediation contractor will be required to remediate the material and surrounding soil in accordance with CDPHE Solid Waste Division. Report discovery of material to CDPHE.

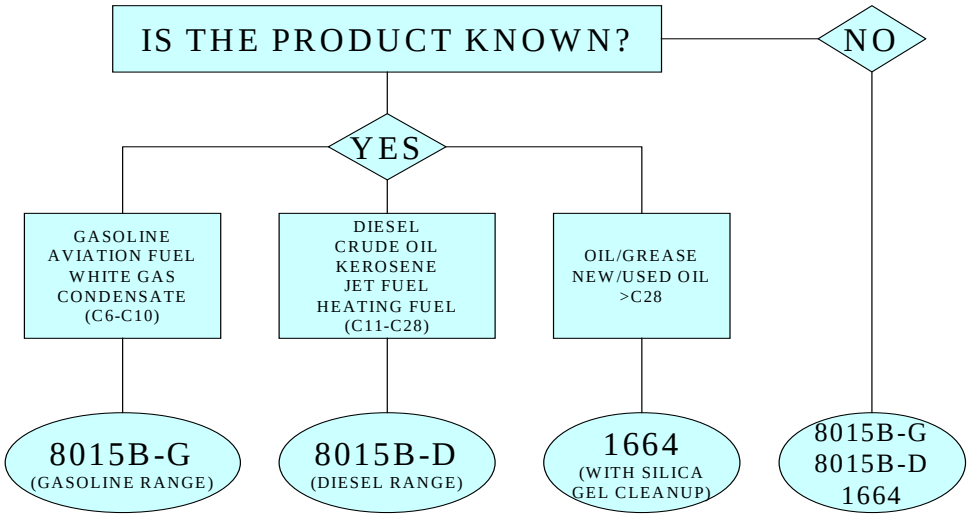
2. Petroleum Products

If a significant amount of visually stained soil or petroleum contaminated soil (PCS) are encountered (that are not associated with a LUST or UST), IRG will follow the *Colorado Department of Labor, Oil Inspection Section, Owner/Operator Guidance,* dated October 2005 and soil samples of the material will be collected. The analytical suite will include total petroleum hydrocarbons (TPH)-diesel and gasoline and BTEX, as required by the Colorado Department of Labor and Employment, Division of Oil and Public Safety (OPS). The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated.

All samples collected are required to be analyzed for BTEX. These compounds should be analyzed using USEPA methods 8021or 602 as presented in SW-846, or an equivalent method approved by the OPS. EPA method 8260 may also be appropriate, especially in cases where a waste oil tank is/was present.

All samples collected are required to be analyzed for TPH. TPH should be analyzed using USEPA methods 1664 or 8015B as presented in SW-846, or an equivalent method approved by the OPS. The following flow chart may be used to determine the appropriate analytical method based on the product type at the site.

ANALYTICAL METHODS FOR TPH



If TPH concentrations exceed 500 parts per million (ppm), and BTEX concentrations are below site cleanup goals, then a sample taken from the location where the TPH concentration was the highest must be analyzed for the priority PAHs. The priority PAHs are listed below:

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)flouranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Flouranthene
- Flourene
- Indeno(1,2,3-c,d)pyrene
- Naphthalene
- Phenanthrene
- Pyrene

PCS with TPH concentrations in excess of 500 mg/kg will be sent off-Site for disposal. Soil will be removed until passing results (TPH below 500 ppm and PAHs are below Tier 1 Risk Based Screening Levels (RBSLs)) or regulatory approval to leave in place. If the concentrations are lower than the Tier 1 RBSLs for all completed pathways, and the TPH threshold has not been exceeded, a No Further Action Required designation will be requested.

3. Underground Storage Tanks

Underground storage tanks identified during Site remediation and redevelopment activities will be removed in accordance with the Colorado Department of Labor and Employment, Oil and Public Safety (CDLE, OPS) guidelines, found at 7 CCR 1101-14. The tank will be removed in accordance with sections 2-5-2 through 2-5-5 of the guidelines. Confirmatory soil samples for soils found around the UST will be collected for TPH-diesel and gasoline and BTEX. The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated. At a typical UST closure site, samples must be collected from under the tanks, near the dispensers and along the dispensing lines, in areas where staining or odors are noted, and/or in areas with elevated field instrument readings. If TPH results exceed 500mg/kg, the list of 16 PAHs in the Regulations must be analyzed and compared to Tier 1 risk based screening levels. PCS with TPH concentrations in excess of 500 mg/kg will be sent off-Site for disposal. Soil will be removed until passing results (TPH below 500 ppm and PAHs are below Tier 1 RBSLs) or regulatory approval to leave in place. If the concentrations are lower than the Tier 1 RBSLs for all completed pathways, and the TPH threshold has not been exceeded, a No Further Action Required designation will be requested.

4. Polychlorinated Biphenyls Waste

If any polychlorinated biphenyls (PCB) waste is visually identified, the waste will be tested and delivered off-Site for disposal at a licensed facility. PCB waste can include the following items:

- Light Ballasts
- Transformers
- Voltage Regulators
- Circuit Breakers

Any light ballasts encountered at the Site will be assumed to contain PCBs. PCB-containing wastes are regulated by the USEPA under the Toxic Substances Control Act (TSCA) under 40 CFR 761. These regulations allow persons, other than manufacturers of ballasts, to dispose of non-leaking PCB ballasts as municipal solid waste with the prior approval of the solid waste landfill. Leaking PCB ballasts are considered PCB waste and must be properly packaged for transportation according to the USEPA and DOT regulations. In accordance with USEPA regulations, leaking PCB ballasts and other PCB-containing wastes must be sent to a TSCA-permitted high temperature incinerator.

The reportable quantity of PCBs is one pound under CERCLA, which has been estimated by USEPA to be equivalent to ten light ballasts. Liquids and solids containing PCBs greater than 50 ppm must be containerized, stored, and transported, and disposed of in accordance with TSCA requirements. Permitted PCB disposal facilities in the region include:

- Clean Harbors Environmental Services, Inc. – Kimball, Nebraska (308-235-4012).

- Lone Mountain Landfill – Waynoka, Oklahoma (580-697-3500).
- Clean Harbors Deer Trail, LLC – Adams County, Colorado (970-386-2293).

5. Hazardous Waste

If visually encountered during excavation, suspect hazardous waste will be characterized and transported off-Site for disposal. Because historic data and information indicates that the landfill was used for MSW, hazardous waste; however, is not expected to be encountered.

Solid waste are considered non-hazardous unless they exhibit a hazardous "characteristic" (toxicity, reactivity, ignitability, or corrosivity), or have been specifically listed a hazardous waste by the USEPA (known as a "listed waste"), as described on Table 1. Regulatory criteria for hazardous waste based on TCLP concentrations are detailed in Table 2. Listed wastes are specific wastes, or are mixtures or wastes derived from those listed wastes. These materials may be from nonspecific sources such as spent solvents, or may be wastes from specific sources or wastes from discarded chemical products.

If hazardous wastes are discovered at the Site, these materials will be packaged, manifested, characterized, transported, and disposed in compliance with CERCLA/RCRA and DOT regulations. All hazardous waste shipped from the Site must be packaged in accordance with DOT regulations per 49 CFR Parts 173, 178, and 179 and 6 CCR 1007-3, Sections 262.30 through 262.33. Hazardous waste accumulations containers will be labeled as "Hazardous Waste." Regulations concerning hazardous waste containers are provided in 6 CCR 1007-3, Section 265 Subpart I. In accordance with 6 CCR 1007-3, Section 262, hazardous waste manifests must note the USEPA ID number of the generator, all transporters of the waste, and the ultimate disposal facility. Regulations require generators to test the waste, or use process knowledge of the waste, to determine of the waste is restricted from land disposal, and certify that the wastes meet the treatment standards described in 6 CCR 1007-3, Section 268, Subpart D. RCRA-permitted hazardous waste disposal facilities in the region include:

- Clean Harbors Environmental Services, Inc. – Kimball, Nebraska (308-235-4012).
- Lone Mountain Landfill – Waynoka, Oklahoma (580-697-3500).
- Clean Harbors Deer Trail, LLC – Adams County, Colorado (970-386-2293).

G. PROCEEDURES FOR ADDRESSING POTENTIALLY CONTAMINATED SOILS AND WASTE

In addition to the regulatory standards identified in the previous section, If potentially contaminated soils and waste are encountered during excavation that is not associated with AGM, the following characterization procedures will be followed to determine waste type for disposal:

a) Excavation

i) When potentially contaminated soil is encountered during excavation, a determination will be made as to whether excavation can continue and an assessment of sampling needs will be made. These initial decisions will be based on visual and olfactory observations. IRG may excavate these soils for characterization and disposal.

ii) If the potentially contaminated soil is excavated, that soil will be managed as hazardous waste, unless IRG can determine based upon visual and olfactory observations, historical information or field testing that the potentially contaminated soil is non hazardous or sample results determine it is not a hazardous waste.

(a) In the event that potentially contaminated soil is hazardous, RCRA requires that all hazardous wastes must be containerized. In addition, RCRA hazardous waste cannot be stored for more than ninety (90) days without written approval from CDPHE. The ninety (90) days begin when the soil is removed from the excavation.
(b) In the event that the contaminated soil is contaminated with petroleum, the soil will be handled in accordance with the regulations of the Colorado Department of Labor Division of Oil and Public Safety (See 7 Colorado Code of Regulations sections 1101-14).
(c) In the event that the potentially contaminated soil is special waste and/or a solid waste, as that term is defined in RCRA, IRG will address that waste pursuant to the applicable Colorado statutes and regulations.

b) Sample Collection

i) IRG will collect samples prior to excavation from the potentially contaminated soil in order to characterize the potential contaminant(s). Samples shall be analyzed for applicable waste profile parameters and any additional parameters as specified by CDPHE. Samples will be collected according to the protocols listed below and submitted to a laboratory for analysis.

(a) The impacted soil within the excavation shall be collected from locations that appear to be the most contaminated and an appropriate number of samples will be collected to characterize the observed contamination. IRG will consult with CDPHE on the timing and frequency of sampling, and the parameters of the sampling suite.
(b) Samples shall be collected by using appropriate personal protective equipment (PPE).
(c) Samples shall be collected using appropriate sample containers and preservatives following USEPA protocols.

(d) Samples shall be collected practicing appropriate decontamination procedures when necessary.
(e) Samples shall be collected by practicing the following field quality assurance/quality control (QA/QC) as discussed in Section F of the SMP.

c) Quality Control Requirements

QC samples will be analyzed as specified below:

QC Type	Frequency
Trip Blank	One per cooler containing VOCs
Field Duplicate	10%
Matrix Spike/ Matrix Spike Duplicate	10%
Equipment Blank	One per activity if equipment is reused

One trip blank will accompany each cooler of samples sent to the laboratory for analysis of VOCs to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. Equipment blanks will not be collected if new sampling equipment will be used for every sample.

To assess precision of the sample collection process, field duplicate samples will be collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified as duplicate samples by laboratory personnel performing the analysis (blind duplicate). Specific locations are designated for collection of field duplicate samples prior to the beginning of sample collection. Field duplicates will be collected at a frequency of one in 10 samples collected.

d) Laboratory Analysis

These samples will also be submitted to the laboratory for quick turn-around to obtain results in a timely manner in order to determine the appropriate additional remedial action and disposal options.

The samples will be analyzed for a wide range of analyses, listed in the Response Matrix and any site specific additional analyses that CDPHE may require (Table 1).

DRAFT

Former Lowry Air Force Base

FINAL Transition Plan II

November 21, 2006

SOILS MANAGEMENT PROGRAM & ASBESTOS SOIL CHARACTERIZATION AND MANAGEMENT PLAN

Prepared by:

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7991 Shaffer Parkway, Suite 300
Littleton, CO 80127

STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

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Colorado Department
of Public Health
and Environment

December 4, 2006

Mr. Joe Aiken
Lowry Assumption, LLC
7991 Shaffer Parkway, Suite 100
Littleton, CO 80127

Re: Submittal of the Final Transition Plan II and Response to Comments
Lowry AFB, Denver, CO

Dear Mr. Aiken:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) has received and reviewed the above mentioned document submitted as a requirement under Consent Agreement Number 01-08-07-02. The Division is satisfied that our comments to the draft document were addressed in the final document. We approve this final document.

If you have any questions, please call me at (303) 692-3332.

Sincerely,

Sheila Gaston
Remediation and Restoration Unit
Remediation Program
Hazardous Materials and Waste Management Division

cc: Pat Smith, EPA-Region 8
Deb Gomez, Denver Department of Environmental Health
Jim Schrack, City of Aurora
Paul Carroll, Air Force – Reese
Ann Wei, IRG
File – Lowry AFB, 1.1

VII. SOILS MANAGEMENT PROGRAM

This Soils Management Program (SMP) is being submitted in accordance with Paragraph 23a.ix of the Consent Agreement. This SMP will be implemented as a precaution to address unknown conditions encountered during soil disturbing activities, including but not limited to excavation, construction, installation and maintenance of utilities, and other intrusive activities that may lead to the discovery of environmental conditions that require characterization, investigation or remedial actions at the LAFB. LAC has drafted a site-specific Health and Safety Plan for field operations, performed under this program by LAC employees.

The SMP is organized as follows:

- Section A provides a brief background of the environmental issues at LAFB, and explains the need for a soils management program.
- Section B identifies the various parties and stakeholders and responsibilities of these parties as defined under the Consent Agreement.
- Section C addresses identification of potential contaminants of concern associated with historic activities at LAFB.
- Section D addresses protocols for construction/maintenance projects that involve the disturbance of soil, including construction oversight activities, reporting of suspect soil, and annual training sessions for workers.
- Section E addresses protocols for suspect contaminated soil, including the process for investigation, soil sampling and characterization, methodology and frequency, excavation and removal requirements, cleanup levels, and disposal procedures for soils that contain hazardous materials or solid waste.
- Section F addresses requirements that need to be fulfilled in order to achieve closure and/or notice of completion.
- Section G addresses LAC's program for annual training on the SMP.

The SMP is to be used as 1) a project planning tool for future soil excavation activities throughout LAFB as defined in the Consent Agreement; 2) as a communication tool to assure that the CDPHE, the USEPA, and other stakeholders understand the approach and timing of LAC's planned activities; 3) a tool to generate discussion so that LAC understands the needs and requirements of CDPHE, USEPA, and other stakeholders; and 4) to provide a framework to achieve the goals of the Consent Agreement including "seeking ways to accelerate corrective actions and eliminate unnecessary tasks and reviews by facilitating a close working relationship between all parties."

The SMP is not intended to provide detailed information on any subject, but is intended to identify and provide guidance on addressing potential unknown soil contamination that may be encountered during soil disturbance activities. Each of the activities that may be performed in conjunction with this Program may be expanded and detailed in a series of Work Plans or other interim actions as directed by CDPHE, and prepared in accordance with the Consent Agreement.

A. BACKGROUND

Numerous basewide assessments/investigations have been performed or are ongoing for the LAFB, including those presented below. This section provides a summary of investigations and remedial actions and a brief overview of the current LAFB soils management program, including the implementation of the Lowry Asbestos in Soils Decision Tree (Lowry Decision Tree).

1. Status of Investigations and Remedial Actions at LAFB

The most detailed explanation of the status of investigation and remediation activities at LAFB is presented in the RFA, performed by the Air Force, and submitted to CDPHE in January 2005. Table 3-6 from the RFA provides a list of the investigations performed to date. Response actions have been completed at many environmental sites at the LAFB as described in the RFA. These actions include closure of the former base landfill, removal of soil containing petroleum products, PCBs or PAHs, and closure of numerous storage tanks.

Other sites have undergone investigation and are currently in the response action or remediation and cleanup phases, meaning that regulatory site closure has not yet been achieved. Current response actions planned or underway include: OU5 groundwater investigation and remediation; the FTZ soil remediation; the OFR soil and MEC remediation; closure of OU2 located in the south-central portion of the LAFB (awaiting approval of closure documents); groundwater remediation and monitoring at Building 606; investigation and potential remediation of mercury in soil at Building 898; abandonment of former water supply wells at former Buildings 950 and 1435; and additional asbestos investigation and removal actions associated with the LAFB NWN. In addition, the RFA recommended several buildings or categories of buildings for further investigation, which are incorporated in the Consent Agreement for additional investigations and potential corrective actions.

2. LAFB Current Soils Management

In October 1997, the Air Force and the LERA implemented the “Revised Final Waste Management Plan for Lowry Infrastructure Projects” (WMP) prepared by Parsons Engineering Science, Inc. The current WMP applies only to the LERA and its subcontractors. The WMP established practices to be followed for handling contaminated materials that may be encountered during all construction activities conducted by the LERA.

Since the implementation of the WMP, the LERA has been successful in developing over 70% of the former base in conjunction with the Air Force’s environmental cleanup projects; and approximately 700 acres will be developed under the privatized environmental program. Portions of this property were contaminated by historical Air Force activity.

In addition to the WMP, the LERA has implemented the Lowry Decision Tree with regard to unknown discoveries of asbestos in soil. This Decision Tree is provided as Exhibit 6.

B. ROLE AND RESPONSIBILITIES OF THE PARTIES

Close coordination among the parties and stakeholders is necessary to ensure that soil disturbance activities are compatible with the remediation activities. Without proper coordination, workers and the general public could be exposed to contaminants; projects could be easily delayed by environmental problems; and cost overruns could occur. Proper coordination will ensure that soils are excavated, stored and/or disposed in accordance with the SMP and the Consent Agreement.

The roles and responsibilities of the various entities as they are related to soil disturbance activities are outlined below:

LAC – fulfillment of requirements of Consent Agreement, provide construction oversight to all excavations (including infrastructure); address discoveries with an expeditious, predictable process for characterization, investigation and remedial activities.

LERA – coordinate with LAC on redevelopment activities.

CDPHE – lead regulatory agency.

Other Stakeholders (Air Force, City and County of Denver, USEPA, City of Aurora) – review of documents; coordination of oversight activities.

C. IDENTIFICATION OF POTENTIAL CONTAMINANTS OF CONCERN

LAFB operated from 1937 to 1994 as an Air Force technical training center. Table 3-1 of the RFA provides a general description of the former facilities at LAFB. The primary mission at LAFB through its 57 years of operational history focused on training Air Force personnel. Based on the operational history, training programs at LAFB focused on armament and photographic training. However, a variety of base-related operations such as routine aircraft overhaul and maintenance (prior to 1966) as well as facility maintenance activities occurred prior to base closure. The potential contaminants of concerns identified in this section are summarized based upon the RFA, which examined the base operations and an understanding of Air Force standard operating procedures and programmatic Air Force knowledge.

The RFA divided the identification of potential contaminants of concern into those associated with training programs and those associated with daily base operations. As for training programs at LAFB, chemicals and materials were generally used in quantities appropriate for instructional purposes, including the use of mockups. The types of chemicals that were potentially used, stored, and disposed of for training purposes included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), radionuclides, metals, petroleum-based products, explosives, and ordnance-related materials.

The training programs and the facilities associated with that training listed below are an indication of the various training programs throughout the operational duration of LAFB that may have resulted in potential environmental concerns, and include:

Armament-Related Training (including small arms): Facilities where personnel were trained on the proper maintenance, handling, storage, and loading operations for conventional weapons. Potential contaminants of concern include petroleum, oil, and lubricant (POL) products, organic chemicals, heavy metals, and solvents.

Chemical Warfare Training: Facilities where personnel were trained in chemical warfare including incendiary control, decontamination, and first-aid training for gas casualties. Potential contaminants of concerns include tear gas, radiological, POL products, solvents, organic chemicals, and heavy metals.

Fire Fighting Training: Open areas, vehicle and aircraft mockups, and buildings used to train personnel on extinguishing fires. Potential contaminants of concern include flammable material used to fuel fires (POL, spent solvents and off-spec fuels); water and chemical based foams, powders used to extinguish fires (organic chemical); and, dioxins generated during chlorinated-fuel combustion.

Flight Training: Facilities associated with flight training. Potential contaminants of concern include POL products and solvents.

Missile Training (guided and ICBM): Facilities associated with missile (e.g., Snark, Titan, and Peacekeeper) training and inspection. Potential contaminants of concern include radiological, POL products, solvents, organic chemicals, and heavy metals.

Ordnance Training: Facilities associated with small and medium-caliber (i.e., 20mm arms firing ranges, skeet and trap ranges, aircraft machine gun “pits,” and ordnance storage facilities). Potential contaminants of concern include radiological, POL products, solvents, organic chemicals, and heavy metals.

Photography and Cinematography Training: Facilities associated with the development of film and maintenance of photography equipment. Potential contaminants of concern include POL products, radiological, organic chemicals, and heavy metals.

Precision Measurement Equipment Laboratory (PMEL) Training: Facilities associated with field-level maintenance and calibration of test, measurement, and diagnostic equipment (TMDE). Potential contaminants of concern include radiological, mercury, and hydrocarbons.

In addition during its operational existence, LAFB was comprised of over 1,000 facilities (e.g., buildings, structures, or areas) that supported training, maintenance, and other missions. Although the initial training facilities were located in the western portion of the base, the tremendous expansion experienced in a relatively short period of five (5) years (during World War II) led to the construction of additional training facilities in the eastern portions of the base. A large infrastructure was developed to support and sustain a residential and working population that ranged from less than 200 to more than 10,000 people annually. These facilities included gas stations, garages, machine shops, hobby facilities, outdoor maintenance facilities, steam plants, and steam lines for heating. Other features of the infrastructure that are relevant to environmental concerns included storage and warehousing of materials and chemicals, waste accumulation facilities, and onsite disposal facilities. Other prominent features of the

infrastructure were the sewer lines or septic systems, sumps, oil-water separators, and floor drains, as these are potential release points to the subsurface. Generally, potential contaminants of concern include fuels used in emergency power generating units; associated underground storage tanks, pipelines, and above ground storage tanks; POL products; solvents; organic chemicals; paints; asbestos; pesticides, herbicides, PCBs, other organic chemicals, and heavy metals.

D. PROCEDURES FOR CONSTRUCTION OVERSIGHT AND REPORTING OF SUSPECT MEDIA OR DEBRIS

In order to mitigate any potential release or threatened release of hazardous substances as a result of redevelopment activities, LAC will provide construction oversight services for soil disturbing activities at LAFB, within the boundaries defined in the Consent Agreement (excluding the DFAS property west of Quebec Street). LAC is coordinating closely with the LERA on notifying potential purchasers of the property of the SMP, and the requirements of LAC under the Consent Agreement. LAC is entering into separate oversight agreements with each developer and the Colorado Community College System (CCCS) on the former HEAT campus in order to execute this task, and address the issue of responsibility and liability for potential discoveries on each respective parcel.

Construction oversight services include the necessary observation and documentation of soil excavation activities within the geographic boundaries of LAFB, excluding the DFAS property west of Quebec Street, with the intent of identifying any unknown environmental contamination and minimizing potential releases to the environment. This oversight will include visual or olfactory observations during the excavation of soil during the Project as defined in the Consent Agreement.

Excavation means foundation excavations, underground utility installations, and other material excavations of the land surface. Excavation excludes the following: normal maintenance and operation associated with the current ownership of already redeveloped commercial or residential property; clearing and grubbing; site preparation; normal maintenance and operation of the golf course; existing parks, including repairs and maintenance to sprinkler systems; and planting of flowers, trees and shrubs. Existing roads and right of ways not located in the NWN of LAFB are also excluded.

LAC may request a waiver of construction oversight if the site has already been excavated and redeveloped by either the LERA or other third parties or upon written approval of the CDPHE. Information to request for this waiver may include, but not be limited to, documentation of previous remedial activities, visual inspections, documentation of redevelopment activities such as addition of fill, installation of utilities, etc.

- Except in the case of an emergency, the oversight process will be implemented when a dig notification is provided to LAC by telephone or email. As noted above, LAC will have separate agreements (Oversight Agreements) with various future owners, including the LERA and CCCS, which articulate the notice requirement (between 24 to 48 hours advance notice).

- LAC will perform a review of existing environmental reports and historical use information to identify for the Owner and the CDPHE any potential environmental contamination issues associated with these locations. Activities associated with this task will be documented in the monthly progress report to the CDPHE.

- In emergency situations, such as a broken water line or utility repair, the Owner will notify LAC as soon as practicable, and LAC will inspect the excavation as soon as practicable.

1. Oversight Procedure

a) LAC will provide an oversight technician (technician) with a State of Colorado asbestos building inspector certification (or other appropriate certification, i.e. Abatement Worker or Air Monitoring Specialist) and OSHA 40-hour HAZWOPER training, to perform field monitoring for all possible environmental contamination. The technician will screen for the usual and customary indicators of contamination, such as discolored soil, visible free product, and odor, as well as friable and non-friable asbestos debris. If required by this SMP or CDPHE, the technician will screen for potential hazards to human health using a photoionization detector and/or field detector tubes and set up appropriate safety control measures if necessary.

2. Reporting Potentially Contaminated Media

a) If the field technician suspects or detects potentially contaminated media, he or she shall immediately notify the LAC Oversight Coordinator or designee:
   - LAC Oversight Coordinator Telephone: **303-972-6633**

b) The Inspector will take appropriate actions to prevent exposures to workers and surrounding areas from any suspect materials. Action levels will be set based on specific equipment and calibration, and will meet the minimum described in the LSAL, attached as Table 5-1, and in accordance with the Response Action Matrix, attached as Table 7-1.

c) The LAC Coordinator will confirm the observations and determine whether additional investigation must be performed before construction activities resume.

d) Activities may continue if the potentially contaminated area is isolated or in one distinct area of the disturbance, and will remain undisturbed by continued work in other areas of the site.

e) The LAC Coordinator will verbally notify the CDPHE Project Manager for LAFB of the observations based on Response Matrix, attached as Table 7-1, and follow up the verbal notification by email. LAC will also notify the Owner of the property under its Oversight Agreement.

E. GENERAL PROTOCOLS FOR HANDLING PARTICULAR CONTAMINANTS OF CONCERN

1. Protocols for Handling Suspect Contaminated Soils (Non-asbestos)

If potentially contaminated soils are encountered during excavation that is not associated with asbestos, the following procedures will be followed:

a) Excavation

i) When potentially contaminated soil is encountered during excavation under LAC oversight, the procedures outlined in the Response Matrix will be initiated. Initially, a determination as to whether excavation will continue and an assessment of sampling needs will be made. LAC may excavate these soils for characterization and disposal in accordance with the specifications of the Response Matrix (See Table 7-1).

ii) After the potentially contaminated soil has been excavated, that soil will be managed as hazardous waste, unless LAC can determine based upon visual and olfactory observations, historical information or field testing that the potentially contaminated soil is non hazardous or sample results determine it is not a hazardous waste.

(a) In the event that potentially contaminated soil is hazardous, RCRA requires that all hazardous wastes must be containerized. In addition, RCRA hazardous waste cannot be stored for more than ninety (90) days without written approval from CDPHE. The ninety (90) days begin when the soil is removed from the excavation.
(b) In the event that the contaminated soil is contaminated with petroleum, the soil will be handled in accordance with the regulations of the Colorado Department of Labor Division of Oil and Public Safety (See 7 Colorado Code of Regulations sections 1101-14).
(c) In the event that the potentially contaminated soil is special waste and/or a solid waste, as that term is defined in RCRA, LAC will address that waste pursuant to the applicable Colorado statutes and regulations.

b) Sample Collection

i) LAC will collect samples prior to excavation from the potentially contaminated soil in order to characterize the potential contaminant(s). Samples shall be analyzed for applicable waste profile parameters as specified in the Response Matrix and any additional parameters as specified by CDPHE. Samples will be collected according to the protocols listed below and submitted to a laboratory for analysis.

(a) The impacted soil within the excavation shall be collected from locations that appear to be the most contaminated and an appropriate number of samples will be collected to characterize the observed contamination. LAC will consult with CDPHE on the timing and frequency of sampling, and the parameters of the sampling suite.

(b) Samples shall be collected by using appropriate personal protective equipment (PPE).
(c) Samples shall be collected using appropriate sample containers and preservatives following USEPA protocols.
(d) Samples shall be collected practicing appropriate decontamination procedures when necessary.
(e) Samples shall be collected by practicing the following field quality assurance/quality control (QA/QC) as discussed in Section F of the SMP.

c) Waste Disposal Requirements

Based on laboratory analytical results and comparison of results to the RCRA waste characteristics, a disposal facility will be chosen and the appropriate manifests will be generated for disposal off-site.

2. Procedures for Handling Potential Asbestos Containing Material in Soil

LAFB has two regulatory processes for addressing potential asbestos in soil issues. Both are identified below:

a) LAFB Northwest Neighborhood (NWN):

The NWN is defined as bounded by East 8th Avenue to the south; East 11th Avenue to the north; Quebec Street to the west; and Uinta Way to the east. There are known remedial actions associated with formerly owned Air Force property that will be performed within the NWN pursuant to the Consent Agreement. The scope of those remedial actions will be addressed as approved by CDPHE in a separate work plan under this Transition Plan. In addition, there are ongoing remedial actions by homebuilders in the NWN, as required under the Compliance Advisories issued by CDPHE on April 24th and 30th, 2003.

b) Remainder of LAFB, including within the historical boundaries:

As noted above in Section 2.B. of the SMP, the LERA has implemented the Lowry Decision Tree (Exhibit 6), approved by CDPHE on August 3, 2004. Since this time, the CDPHE has implemented new regulations with respect to asbestos in soil. Exhibit 7, Asbestos Soils Characterization and Management Plan for LAFB, integrates the new regulations and the Decision Tree in order to implement soil management protocols and a process of regulatory closure for asbestos issues. Unknown discoveries of asbestos in soil on the parcels in the NWN after a No Further Action has been issued would be addressed under this plan.

F. REQUIREMENTS TO ACHIEVE CLOSURE (NON-ASBESTOS CONTAMINATED SOILS)

After non-asbestos contaminated soils have been remediated in accordance with Section C of the SMP, including any additional requirements implemented at the request of CDPHE, confirmatory soil samples will be collected from the floor and walls of the excavation. LAC will discuss with CDPHE the appropriate number of samples to be collected to characterize the

excavation for closure. At a minimum, one sample should be collected from each of the four walls and one sample from the floor of the excavation.

1. Quality Control Requirements

QC samples will be analyzed as specified below:

QC Type	Frequency
Trip Blank	One per cooler containing VOCs
Field Duplicate	10%
Matrix Spike/ Matrix Spike Duplicate	10%
Equipment Blank	One per activity if equipment is reused

One trip blank will accompany each cooler of samples sent to the laboratory for analysis of VOCs to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. Equipment blanks will not be collected if new sampling equipment will be used for every sample.

To assess precision of the sample collection process, field duplicate samples will be collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified as duplicate samples by laboratory personnel performing the analysis (blind duplicate). Specific locations are designated for collection of field duplicate samples prior to the beginning of sample collection. Field duplicates will be collected at a frequency of one in 10 samples collected.

2. Laboratory Analysis

These samples will also be submitted to the laboratory for quick turn-around to obtain results in a timely manner in order to determine the appropriate additional remedial action and disposal options.

The samples will be analyzed for a wide range of analyses, listed in the Response Matrix and any site specific additional analyses that CDPHE may require (Table 7-1). Table 5-1 provides the analytes for each group. Based on the historical knowledge and operations of a particular site, the analyses may be limited or expanded to include the appropriate analytical groups, such as VOCs, SVOCs, heavy metals, etc.

If petroleum products are found, the analytical suite will include total petroleum hydrocarbons (TPH), BTEX, and PAHs as required by the Colorado Department of Labor and Employment, Division of Oil and Public Safety (OPS). A more detailed description of the requirements for petroleum-contaminated soil is presented below.

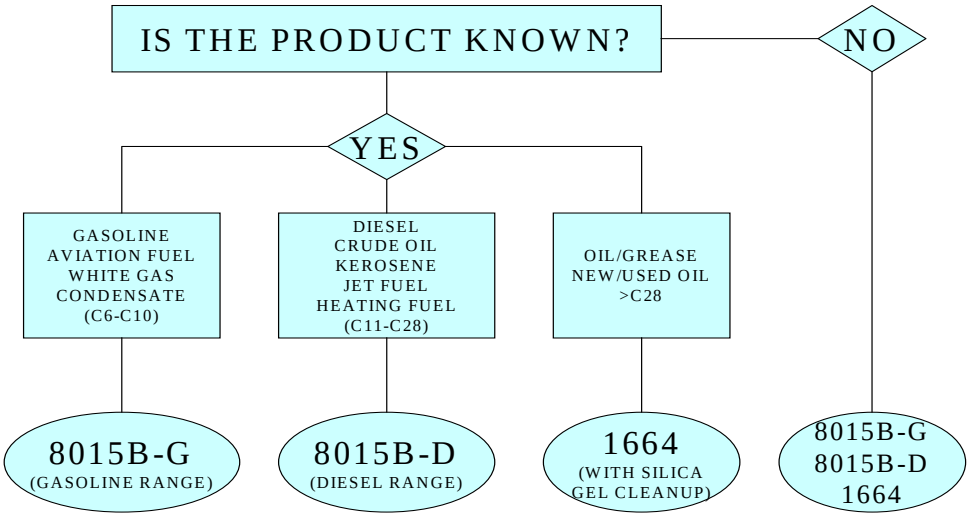
a) Petroleum products

If petroleum products are observed, LAC will follow the *Colorado Department of Labor, Oil Inspection Section, Owner/Operator Guidance,* dated May 2005.

All samples collected are required to be analyzed for BTEX. These compounds should be analyzed using USEPA methods 8021or 602 as presented in SW-846, or an equivalent method approved by the OPS. EPA method 8260 may also be appropriate, especially in cases where a waste oil tank is/was present.

All samples collected are required to be analyzed for TPH. TPH should be analyzed using USEPA methods 1664 or 8015B as presented in SW-846, or an equivalent method approved by the OPS. The following flow chart may be used to determine the appropriate analytical method based on the product type at the site.

ANALYTICAL METHODS FOR TPH



If TPH concentrations exceed 500 parts per million (ppm), and BTEX concentrations are below the site cleanup goal, then a sample taken from the location where the TPH concentration was the highest must be analyzed for the priority PAHs. The priority PAHs are listed below:

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)flouranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Flouranthene
- Flourene
- Indeno(1,2,3-c,d)pyrene
- Naphthalene
- Phenanthrene
- Pyrene

The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated. At a typical UST closure site, samples must be collected from under

the tanks, near the dispensers and along the dispensing lines, in areas where staining or odors are noted, and/or in areas with elevated field instrument readings.

If the concentrations are lower than the Tier 1 RBSLs for all completed pathways, and the TPH threshold has not been exceeded, a No Further Action Required designation may be requested. If the source concentrations exceed the Tier 1 RBSLs, the owner/operator may proceed to Tier 1A, or to a CAP, which may include proposed corrective actions and a Tier 2 evaluation.

3. Data Evaluation

The LSAL (Table 5-1) will be used to compare to sample results. If soil concentrations are below these values, the site may be recommended for no further action. If there are exceedances of these values, further actions such as investigative sampling, risk assessment, remedial actions, or additional excavation with confirmation sampling may be recommended. If addition excavation is required, LAC will submit modifications to CDPHE to address any additional issues for closure.

In accordance with Paragraph 50 of the Consent Agreement, within ninety (90) days of completion of required corrective actions, LAC will submit a Notice of Completion. The Notice of Completion may include, but not be limited, to the following summarizing the investigation and sampling will be submitted to CDPHE:

- Executive Summary
    - Describe product or contaminant found
    - Show highest concentration of contaminants left in place
    - Compare to Lowry Soil Action Levels and Groundwater action levels, as appropriate
- Site Description with Location Map
- Investigation Description with field observations and Sampling Map
- Data Evaluation with Laboratory Results Table
- Justification for Notice of Completion request
- Appendices including Laboratory reports, chain of custody forms and Disposal Documentation

G. Annual Training

LAC will offer annual awareness training and/or publications to anyone who may be working with the soil at LAFB, through either redevelopment activities or maintenance and repairs of existing systems, including Owners and their workers at LAFB. Such training will focus on the following topics:

- Summary of the SMP and any amendments thereto,
- Any additional requirements mandated by local, State or Federal law, and
- Any modifications to the known conditions at the site.

LAC will publish such meeting dates in conjunction with CDPHE and the LERA. The training offered by LAC is intended to provide the public with general information relating to its activities

and programs at LAFB. This training is not intended to replace or substitute for notification or communication with LAC on specific oversight activities and protocols regarding discoveries of potential environmental issues at LAFB. LAC will publicize the training through available channels and through contractual agreements with property owners.

Table 7-1 Response Matrix

Issue/Field Observations/Contaminant	IH Response	Initial Action	Disposal Sampling Parameters	Follow-On	Closure Sampling Parameters	Reference/Standard/ Guidance	Reporting to CDPHE
Asbestos - Non-Friable	None	Bag, and dispose, Continue excavating with oversight, following decision matrix		If amount exceeds 55 gallon drum, permit and submit letter describing scope, and disposal plan		Soils Characterization and Management Plan (Tab**)	Air Div Permit
Asbestos Friable	Hydrate, cover with poly, and restrict access or Mag Chloride and restrict access	Continue excavating with oversight, following decision matrix	Confirmation that material contains asbestos will be done by PLM, or material will be assumed to be ACM	If amount exceeds 55 gallon drum (including contam soil 3cf=22 gal), notify CDPHE, permit and submit workplan with emissions control Continue with GAC		Soils Characterization and Management Plan (Tab**)	Air Div permit, summary report from GAC
Asbestos found in the Northwest Neighborhood			Confirmation that material contains asbestos will be done by PLM, or material will be assumed to be ACM			Compliance Advisory	Air Div permit, summary report from GAC
Fly Ash	Control dust with water, Limit Skin contact	Continue excavating controlling visible dust	TCLP RCRA 8 Metals, PAH (verify with facility)	Excavated spoils can be place back in trench except the 0-2 foot interval must be clean fill or spoils may be disposed of as special waste based upon analytical results	Metals, PAH	Lowry Action Level Table	Monthly report or closure summary letter
Groundwater	Check with OVA/PID; limit skin contact	OVA in breathing zone greater than 2.5 ppm stop work	VOCs/BTEX	If groundwater is encountered in an area over one of the known groundwater plumes or suspected to be contaminated, groundwater should be containerized, sampled and disposed appropriately by Owner/Developer of site			Email notification; Monthly Report
Non-covered conditions - biological weapons, chemical weapons, nuclear devices and components (P2)		Stop Work, secure site		LAC notify AF within 48 hours			Notify w/in 24 hrs
Non-covered conditions - radiological; military munitions; biological warfare agents; chemical warfare agents; nuclear devices and components (P1 - for OU2 and OU5)		Stop Work, secure site		LAC notify AF within 48 hours			Notify w/in 24 hrs
Oily Soil	Monitor OVA/PID	OVA in **breathing zone** greater than 2.5 ppm stop work. Segregate impacted soil, stockpile on poly and restrict access. Sample impacted soils in excavation per closure sampling parameters.	TCLP Benzene, TCLP Lead (If from leaded gasoline suspected), Paint filter or certification	If OVA readings in breathing zone below 2.5 ppm continue to limits of planned excavation. Sample pile for disposal and sample walls and floor of excavation for closure.	TPH by 8015B (gas, Diesel or oil range) and BTEX (8021). If THP>500 analyze for priority PAHs by 8270 as per OIS	Petroleum Storage Tank Owner/Operator Guidance Document, May 2005.	Monthly report or closure summary letter; if hazardous report within 24 hr of determination

Table 7-1 Response Matrix

Issue/Field Observations/Contaminant	IH Response	Initial Action	Disposal Sampling Parameters	Follow-On	Closure Sampling Parameters	Reference/Standard/ Guidance	Reporting to CDPHE
Potential Disposal Area - Bulk Containers	Check with OVA/LEL	Bring in OSHA-trained crew	TCLP, flash point, pH, reactivity as applicable based on contents of containers	Sample bulk wastes and dispose, sample soil beneath containers	VOC, SVOC, Metals, PCB as applicable based on contents of containers	Lowry Action Level Table	Notify w/in 24 hrs
Potential Disposal Area - Petroleum, Solvents, PCB, Fly Ash	OVA/PID Limit skin contact, suppress dust	OVA in breathing zone greater than 2.5 ppm stop work	VOC, TCLP RCRA 8 metals, Paint filter test, PCB screen	If OVA readings below 2.5 ppm. Sample pile for disposal and sample walls and floor of excavation for closure	VOC, SVOC, Metals, PCB	Lowry Action Level Table	Notify w/in 24 hrs
Tank - Petroleum	Check with LEL, OVA	OVA in **breathing zone** greater than 2.5 ppm stop work. Continue excavation with air monitoring, use LEL if confined space.	TCLP Benzene, TCLP Lead (If from leaded gasoline suspected), Paint filter or certification	Remove tank according to LUST requirements	TPH by 1664, 8015B (gas and Diesel), MTBE and BTEX. If TPH>500 analyze for priority PAHs by 8270 as per OIS	Petroleum Storage Tank Owner/Operator Guidance Document, May 2005.	Monthly report or closure summary letter
Tank - Septic	Check with OVA	OVA in **breathing zone** greater than 2.5 ppm stop work	VOC, TCLP RCRA 8 metals, Paint filter test or certification, PCB screen	Sample any sludge present, remove tank and sample discolored soil beneath if present. Follow Piping to leach field	VOC, SVOC, RCRA 8 Metals, PCB	Lowry Action Level Table	Monthly report or closure summary letter; if hazardous report within 24 hr of determination
Tank, Pit, Sump - Oil Water Separator	Check with OVA	OVA in breathing zone greater than 2.5 ppm stop work	VOC, TCLP RCRA 8 metals, Paint filter test, PCB screen	Sample any sludge present, remove tank and sample discolored soil beneath if present.	TPH, VOC, metals	Lowry Action Level Table, OIS if applicable	Monthly report or closure summary letter; if hazardous report within 24 hr of determination
Transformers or Potential PCB Wastes	Limit skin contact, suppress dust	Continue excavation	PCB screen, VOC 8260, RCRA 8 metals	Sample pile for disposal and sample walls and floor of excavation for closure	PCB, TPH	Lowry Action Level Table	Monthly report or closure summary letter
Unexploded Ordnance	Restrict access	Stop Work, secure site		LAC call in UXO Contractor			Notify w/in 24 hrs
Bullet Fragments	Restrict access	Bag, and dispose, Continue excavating with oversight. If volume is greater than 3 cubic feet LAC will call in Remediation Contractor	TCLP Lead <5 mg/kg	Sample pile for disposal and sample walls and floor of excavation for closure	Total Lead <400 mg/kg	Lowry Action Level Table	Email notification; Monthly Report

Exhibit 7

Asbestos Soil Characterization and Management Plan

In an effort to streamline response activities associated with discoveries of unknown asbestos in soils, Lowry Assumption, LLC (LAC) has developed this Asbestos Soil Characterization and Management Plan in accordance with the Colorado Solid Waste Regulations, 6 C.C.R. 1007-2, and Section 5.5. This Plan provides a predictable response and outlines the general procedures planned for identifying and removing asbestos in areas where an unplanned discovery occurs. For ease of reference, LAC has prepared revised asbestos in soils decision tree for its use on the project (See Figure 1 to Exhibit 7) based upon this Plan.

As established in the Environmental Services Cooperative Agreement, as amended, and the Consent Agreement, as amended, LAC will address discoveries of asbestos in soils as described below at LAFB except to the extent that it is an Air Force Obligation as defined in the Cooperative Agreement, as amended.

For this Plan, the property representatives and the contact for all parties performing soil disturbing activities are as follows:

Elizabeth Sopher or John Yerton
Lowry Assumption, LLC
Lowry Field Office
765 N. Uinta Way (Southwest Corner)
Denver, CO 80230
Telephone Number - (303) 972-6633

PROPERTY LOCATION

The former Lowry Air Force Base (LAFB) is located approximately five miles southeast of downtown Denver and included approximately 1,866 acres at the time of base closure. It is bounded generally by Quebec Street on the west, East 11th Avenue on the north, Dayton Street on the east, and Alameda Avenue on the south. Approximately 89 percent of Lowry is located in the City of Denver, and 11 percent is in the City of Aurora (See Figure 1-1 of the Transition Plan – Site Location Map).

1. General Site Description

LAFB operated from 1937 to 1994 as an Air Force technical training center. In many ways, activities at Lowry were similar to those in other communities of the time. A coal-powered steam plant provided heat, gas stations fueled vehicles, municipal waste was taken to a landfill, and machine parts were cleaned with solvents. Fuels and chemicals were stored and used to support the training activities, and disposal of these liquids was conducted using standard waste-handling practices of the day. These activities were undertaken according to what were then generally accepted practices.

Asbestos from building debris and utilities have been discovered and remediated at LAFB. In the Northwest Neighborhood (NWN) of LAFB (8th to 11th Avenue, Quebec Street to Uinta Way) and at several other locations on the former base, friable asbestos in soil has been identified. The asbestos that has been found is primarily related to thermal system insulation, including steam lines and insulation from hot water systems, or tiling, wallboard, attic insulation, and other similar building materials used at LAFB.

2. Description of Proposed Soil Disturbing Activities

The remaining development activities at LAFB include completion of the residential, commercial and recreational development. These activities will result in soil excavation activities, as defined in Section D of the Soils Management Plan (Draft Final Transition Plan II, Section VII), as follows:

Excavation means foundation excavations, underground utility installations, and other material excavations of the land surface. Excavation excludes the following: normal maintenance and operation associated with the current ownership of already redeveloped commercial or residential property; clearing and grubbing; site preparation; normal maintenance and operation of the golf course; existing parks, including repairs and maintenance to sprinkler systems; and planting of flowers, trees and shrubs. Existing roads and right of ways not located in the NWN of LAFB are also excluded.

As described in the Soils Management Plan and in Section 3 below, LAC will provide construction oversight for soil excavation activities associated with the redevelopment including:

- Utility removal and installation
- Grading
- Foundation excavations
- Park and open space construction

Oversight will not be performed by LAC on routine maintenance activities, including, but not limited to, repairs and maintenance to sprinkler systems, planting of flowers, shrubs and trees, and home repairs. However, if visible material containing asbestos or asbestos-contaminated soils is unexpectedly discovered during routine maintenance activities, LAC will provide characterization, oversight and remedial services, if required.

3. Description of Proposed Soil Sampling /Characterization

In order to mitigate any potential release or threatened release of asbestos fibers as a result of redevelopment activities, LAC will provide construction oversight for soil disturbing activities at LAFB. LAC is coordinating closely with the Lowry Economic Redevelopment Authority (LERA) on notifying potential purchasers of the property about the Soils Management Plan ("SMP") and the oversight requirements of LAC under the Consent Agreement. LAC has entered, and will enter, into separate oversight agreements with LERA, as well as each developer, the Colorado Golf Association, and the Colorado Community College System in order to execute this task. The property owner/builder is responsible for compliance with all applicable laws and regulations during all excavation activities that are not the subject to the Consent Agreement.

Construction oversight includes the necessary observation and documentation of soil excavation activities within the geographic boundaries of LAFB, excluding the Buckley Annex (also known as Defense Finance and Accounting Services or DFAS) property west of Quebec Street, with the intent of identifying any ACM and minimizing potential releases to the environment. This oversight will include visual observations during the excavation of soil during the Project as defined in the Consent Agreement.

The following is the process for LAC's construction oversight:

(a) The asbestos construction oversight process will be initiated when a dig notification is submitted to the LAC oversight coordinator by phone: 303-972-6633. Dig notifications are required by contract on all excavations, and if a dig notification is not given and excavation is done on a site, LAC will stop the excavation until an inspector is available.

(b) LAC will perform a review of the environmental record for each location.

(c) LAC will provide oversight of the excavation, including monitoring when material is stockpiled or transferred to another location at LAFB. Each inspector will have a minimum of OSHA 40 Hour training and a Colorado Department of Public Health and Environment (CDPHE) Regulation 8 Building Inspector or other appropriate certificate (i.e., Abatement Worker or Air Monitoring Specialist ("AMS")).

(d) If the inspector identifies potentially asbestos contaminated media, s/he shall immediately stop work on the suspect material and notify the LAC Oversight Coordinator at 303-972-6633 (See Figure 1 to Exhibit 7, Flow Chart).

The LAC Oversight Coordinator will confirm the observations and determine whether additional investigation or response must be performed before construction activities may resume with oversight. This will be based upon whether the potentially asbestos contaminated media falls within the applicability of 6 CCR 1007-2, Section 5.5, and/or any of the exemptions under 6 CCR 1007-2, Section 5.5.2.

If soil sampling or characterization is required by CDPHE in accordance with Paragraph 18i of the Consent Agreement, LAC will work with the CDPHE on a case by case basis under the Consent Agreement protocols, including the location of any proposed sampling, a proposed sampling plan and methodology, proposed analytical method, and documentation requirements. Such documents will be subject to CDPHE review and approval.

4. Proposed Exposure Mitigation and Asbestos Fiber Control Measures

If visible material containing asbestos or asbestos-contaminated soils is unexpectedly discovered during soil-disturbing activities, LAC shall inform CDPHE within 24 hours of the discovery, and implement the following protocols.

<u>Access Restriction</u>

Suspect material and impacted soils will be segregated and stockpiled, wetted and covered with polyethylene until an abatement contractor removes and disposes of the material as friable asbestos waste. The stockpiles will be placed on 6 mil polyethylene, or, when removed, 6

inches of soil beneath the pile will be removed with the pile. Access will be restricted with fencing or caution tape as appropriate to the location and the size of the stockpile or excavation.

Air Monitoring Plan

Project Oversight - A CDPHE certified Air Monitoring Specialist (AMS) will be on-site during all soil remediation activities. The AMS will perform oversight and air monitoring during the removal of contaminated soils. The AMS will perform the daily air monitoring activities described below, and the final visual inspections of soil removal locations.

Air Monitoring - Daily air monitoring will be performed when removing soil: perimeter samplers will surround the work area where the greatest likelihood of asbestos fibers release is expected. The CDPHE-certified AMS will perform the air monitoring activities and determine the quantity and location of the air samples and the number of blank QC samples.

Daily air monitoring will consist of PCM sampling protocol and analysis using NIOSH 7400 Method "A" Rules as required by CDPHE as set forth by the on-site AMS. The samples shall cover all four (4) points of the compass and shall be located as close as possible to the excavation activities. Special emphasis will be placed on areas where residential housing, schools or businesses are nearby.

After analysis of work area samples, if an air sample, analyzed by PCM, contains fiber concentrations above the Maximum Allowable Asbestos Level (MAAL, 0.01 fibers per cubic centimeter), work practices will be reviewed, and TEM samples will be collected the following day. If the TEM sample exceeds the airborne asbestos fiber concentration MAAL (70 structures per millimeters squared), CDPHE shall be notified. Coincident with this reporting, soil removal activities will cease, and a revised emissions control plan will be developed and submitted to the CDPHE to remedy the engineering control issues. Such additional controls may include additional water application, repositioning of equipment and sprayers, or adjustment in work pace. Soil removal will not continue until the CDPHE provides verbal or written authorization to proceed.

The AMS will monitor the work practices of the abatement contractor during soil removal activities. The AMS will ensure the proper wet methods are being used, look for visible emissions around the work area, monitor wind speed and check for visible dust/debris in the area. The AMS will maintain updated air monitoring logs and notes. Air results will be kept on-site and available for review.

All removal activities shall immediately cease when there are sustained winds exceeding 12 miles per hour (mph) for 10 minutes as determined by hand-held on-site instrumentation, or when there are wind gusts in excess of 20 mph.

Work will not be restarted after a high wind stoppage until all wind gust readings drop below 20 mph, and sustained wind drop below 12 mph, for a period of 20 minutes, as determined by hand-held on-site instrumentation.

Emissions Control Plan

The abatement activities will be performed under the following controls including:

- A barrier fence will be installed around the work area.

- A minimum of 6 foot tall fencing with wind screen will be installed around the contaminated soil area. This fencing can only be taken down permanently once the abatement activities have been completed and the area has been cleared by visual inspection by the AMS.

- Areas directly outside the contaminated soil work area that could be impacted by removal shall be covered in 6-mil polyethylene (poly) sheeting.

- A temporary haul road shall be installed if necessary to facilitate the loading of contaminated material into trucks or containers.

- Water will be used to adequately wet the contaminated soil before removal begins.

- The abatement contractor will utilize workers and supervisors that are certified by the CDPHE Air Pollution Control Division and have current documentation.

- After the work area is approved by the AMS/Inspector (i.e. proper engineering controls are in place, adequate saturation of water in soil), soil excavation and removal activities can begin.

- At the truck loading station, a loading pad, made of 12 mil polyethylene, will be used to prevent track-out. The pad will be cleaned as necessary between loads. In addition, tracking materials will be placed at site exit point to prevent track-out.

- The area of impact during excavation and removal activities will be kept adequately wet. The water will be applied using a low flow so as not to generate any run-off.

- Adequate amounts of water will be sprayed onto the point of excavation and the bucket of the loading equipment during all phases of the excavation/removal/load process.

- The equipment operator will collect the contaminated soil and load the soil into the disposal container/trailer. The container/trailer will be lined with 6-mil poly. If the soil being removed has visible asbestos material, the container/trailer will be double lined.

- If contaminated soil is stockpiled prior to loading due to site limitations, it will be placed on 6 mil poly or 6 inches of soil beneath the stockpile will be removed. The pile will be covered with 6 mil poly if it is left onsite after daily operations are suspended.

- In order to minimize the potential for spilling any contaminated soil, the operator will load soil slowly, the bucket will not be overfilled, and the operator will dump soil as low as possible inside the disposal container. A water mist will be sprayed on the bucket and truck bed at the loading point to minimize emissions.

- The AMS/Inspector will watch all excavation and removal activities to look for visible dust/debris to ensure that adequate amounts of water are being applied to the soil in all stages of excavation and removal.

- After the soil removal is finished, and the area has dried out adequately, the AMS will perform a visual inspection to ensure that all asbestos-containing material has been removed from the work area.

- Appropriate PPE will be worn, and a decontamination unit will be utilized to ensure that no ACM is tracked out of the site.

- After all removal activities have finished for this project, the abatement crew will thoroughly clean all equipment before removal from the site.

5. Exposure Mitigation Plan for Asbestos Left in Place

Removal of soil containing asbestos will continue to the limits of the planned excavation, the excavation will be cleared of visible debris, and clean fill will be brought in for backfill. This clearance will be performed by the AMS.

However, if known asbestos in soils are left in place as allowed under the Colorado Solid Waste Regulations, LAC will inform the Owner and the Department of the location and depth of the known asbestos in soils. Under these circumstances, the property will be subject to the Colorado Environmental Covenant Statute, C.R.S 25-15-120 et seq.

6. Disposal of Asbestos-Containing Material or Asbestos-Contaminated Soil

- Segregation of Material
  - Disturbed soils will characterized by the LAC inspector, during oversight. Asbestos-contaminated soils will be characterized and segregated from non-asbestos containing soils based on visual observation. Samples of building debris will be taken where necessary to confirm asbestos content.

- Waste Handling
  - Loading - Trucks will be loaded at the truck loading station, a loading pad, made of 12 mil polyethylene, that will be used to prevent track-out. The pad will be cleaned as necessary between loads. In addition, tracking materials will be placed at site exit point to prevent track-out. Adequate amounts of water will be sprayed onto the bucket of the loading equipment and the truck bed during load process to limit emissions.

  - Packaging - 6 mil poly will be used to line trucks, and a double liner will be used for soils containing visible friable ACM. The soil will be sealed in a burrito wrap the truck will be covered.

  - Transportation - After each waste container/trailer is filled, the waste container/trailer will be sealed, appropriately labeled, manifested and transported to the landfill.

- o Disposal - The asbestos-containing material, associated soils, non-friable ACM, and asbestos-contaminated soil containing no visible asbestos will be disposed in accordance with State solid waste regulations, in accordance with 6 CCR 1007-2, Part 1, Section 5.5.7.

7. Disposal of Asbestos-Containing Material or Asbestos-Contaminated Soil and Project Closeout

Under Section 5.5 of the Solid Waste Regulations, project close-out reports for asbestos-contaminated soil management projects are not required to be submitted to CDPHE. However, those projects conducted under Paragraph 18i of the Consent Agreement will require LAC to submit, review and provide CDPHE with a Completion Report under Paragraph 50.
For all asbestos projects, LAC will maintain complete documentation of the project including:

- Property description and description of area(s) with asbestos-contaminated soil;
- Description of soil disturbing activities;
- Logs of field operations;
- Air monitoring logs and analytical results where applicable;
- Disposal manifests;
- Maps showing the location of any asbestos left in place (where appropriate);
- Description of any engineering or institutional controls for any asbestos left in place;
- Photographs showing pre- and post-removal conditions; and
- Worker certifications.

For those projects not subject to Paragraph 18i of the Consent Agreement, LAC will submit a Letter Report containing documentation of asbestos management to CDPHE containing the following information:

- Property description and project location
- Project description and history
- Documentation of 10-day notice submittal or other notification
- Summary of removal activities, and
- Disposal documentation

If soil sampling or characterization is required by CDPHE in accordance with Paragraph 18i of the Consent Agreement, for these projects,

- LAC will submit plans within thirty (30) days to CDPHE for review (Paragraph 26);

- LAC will submit a revised work plan within forty-five (45) days of receipt of CDPHE comments (Paragraph 28);

- Within fifteen (15) days of CDPHE approval, LAC will implement the plan (Paragraph 29);

- LAC will submit a written report to the CDPHE within thirty (30) days of completing the implementation of the plans (Paragraph 30);

- If the CDPHE determines that the nature and extent of contamination has not been characterized adequately, LAC will submit within forty-five (45) days a revised work plan for additional characterization;

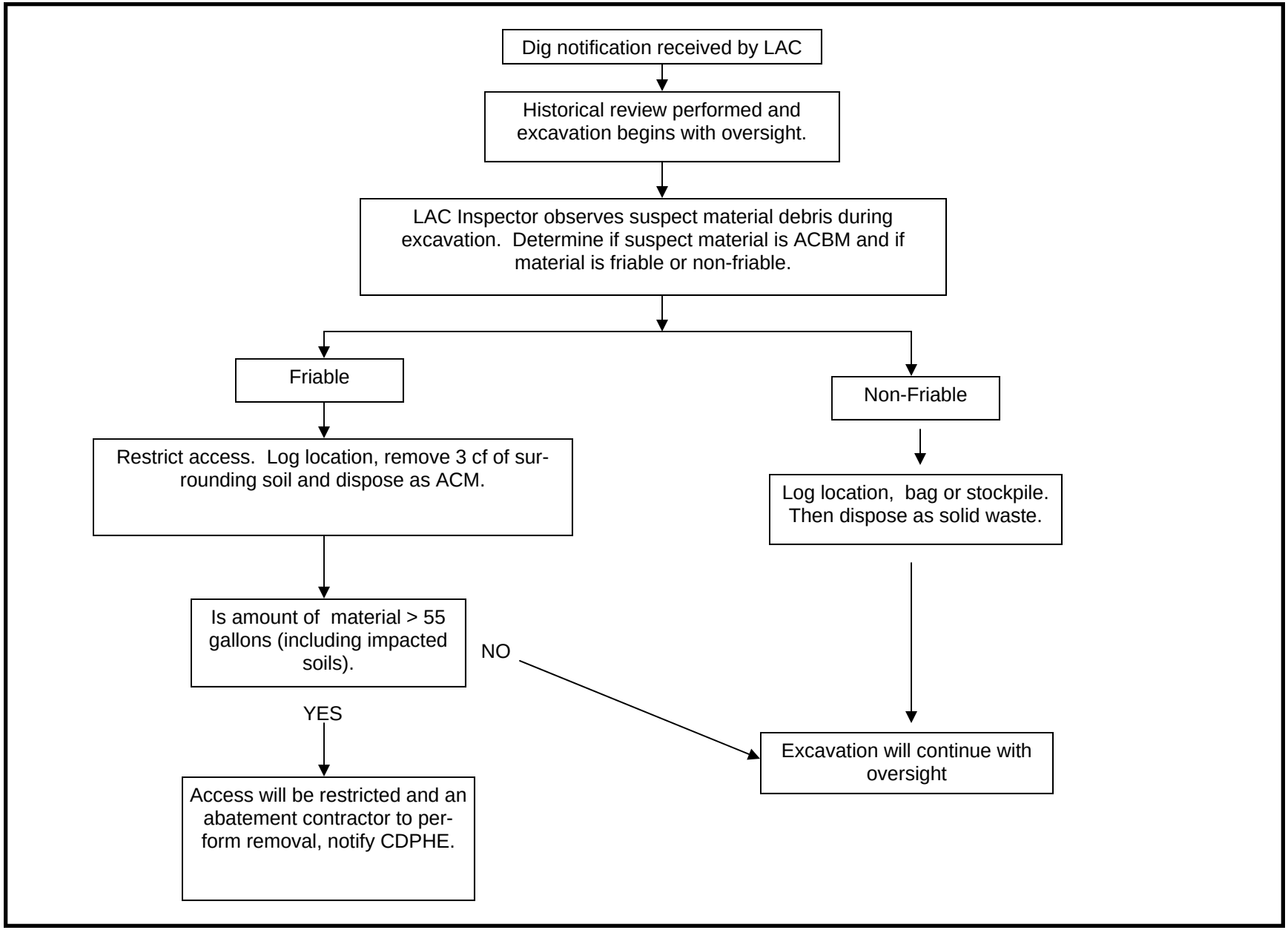
- Within forty-five (45) days of the CDPHE's determination that the contamination has been adequately characterized and that remediation is necessary, LAC will submit a CAP, if determined necessary by the CDPHE (Paragraph 34);

- Pursuant to Paragraph 50, within ninety (90) days of completion of corrective action measures required by the CDPHE, either through CAP or interim actions or other actions executed pursuant to the Consent Agreement, LAC shall submit Completion Reports to CDPHE.

Signature of Project Designer

Jeff Knight, Hudspeth and Associates
Certification # 4172

Exhibit 7 Figure 1
LAFB Asbestos in Soils Flow Chart



APPENDIX E

OPERATIONS, MAINTENANCE AND MONITORING PLAN

POST-CLOSURE OPERATION AND MAINTENANCE PLAN OPERABLE UNIT 2 FORMER LOWRY AIR FORCE BASE

Prepared for:

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MACTEC Engineering and Consulting, Inc.
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November 2003

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ABBREVIATIONS AND ACRONYMS

6 CCR 1007-2	Colorado Regulations Pertaining to Solid Waste Sites and Facilities
bgs	Below ground surface
CCoD	City and Count of Denver
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health and the Environment
CGI	Combustible gas indicator
EPA	U.S. Environmental Protection Agency
ES	Engineering Science, Inc.
FFS	Final Operable Unit 2, Landfill Zone, Focused Feasibility Study, Lowry Air Force Base, Colorado
HDPE	High density polyethylene
LAC	Lowry Assumption, LLC
LEL	Lower explosive limit
LERA	Lowry Economic Redevelopment Authority
Lowry	Former Lowry Air Force Base
LPL	Low permeability layer
MACTEC	MACTEC Engineering and Consulting, Inc. and MACTEC Development Corporation, Inc.
Monitoring Plan	Post-Closure Monitoring Plan, Operable Unit 2, Former Lowry Air Force Base
O&M	Operations and maintenance
O&M Plan	Operations and Maintenance Plan
OU 2	Operable Unit 2
OVA	Organic vapor analyzer
Parsons ES	Parsons Engineering Science, Inc.
Phase 2 CAP	Final Corrective Action Plan for the OU 2 Landfill Closure at Lowry

ppmv	Parts per million by volume
Proposed Plan	Proposed Plan for Lowry Air Force Base Operable Unit 2 Landfill Zone
QA	Quality Assurance
QC	Quality Control
RI	Installation Restoration Program Final Remedial Investigation Report, Lowry Air Force Base, Colorado
SAIC	Science Applications International Corporation
SRI	Installation Restoration Program Final Supplemental Remedial Investigation Report for the Landfill Zone, Lowry Air Force Base, Colorado

1.0 INTRODUCTION

This Post-Closure Operations and Maintenance Plan (O&M Plan) for Operable Unit 2 (OU 2) at the former Lowry Air Force Base (Lowry) was prepared by MACTEC Engineering and Consulting and MACTEC Development Corporation (collectively referred to as "MACTEC" hereafter), and is presented in accordance with the Consent Agreement (dated August 14, 2002) between Lowry Assumption, LLC (LAC), Lowry Economic Redevelopment Authority (LERA), and the Colorado Department of Public Health and the Environment (CDPHE). This O&M Plan is a contract deliverable for LAC that presents the post-closure monitoring, maintenance, documentation, and reporting requirements for OU 2 after the closure construction at OU 2 has been completed. This O&M Plan has been prepared in accordance with Paragraph 38 of the Consent Agreement and the applicable sections of the Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities (6 Colorado Code of Regulations [CCR] 1007-2).

This O&M Plan has been prepared as an appendix to the Final Corrective Action Plan for the OU 2 Landfill Closure at Lowry (Phase 2 CAP). The Phase 2 CAP and its appendixes provide the Final Closure Design Drawings, Construction Specifications, and Quality Assurance (QA)/Quality Control (QC) Plan for the construction of the OU 2 landfill cap and its associated structures along with the Post-Closure Monitoring Plan, Operable Unit 2, Former Lowry Air Force Base dated November 2003 (Monitoring Plan). The QA/QC Plan requires that a construction completion report and record drawings be prepared at the end of construction. These documents will be provided to the party performing the post-closure operations and maintenance (O&M).

1.1 Purpose and Objectives

The purpose of this O&M Plan is to describe the procedures and provide guidance for the O&M activities to be carried out during the OU 2 post-closure period. The objectives of this O&M Plan are to:

- Provide general information relative to OU 2 and pertinent references to other OU 2 documents.

- Identify those aspects of the OU 2 post-closure period requiring monitoring, reporting, and potential maintenance and the associated monitoring, reporting, and maintenance procedures.
- Meet the post-closure care requirements set forth in Colorado Regulations Pertaining to 6 CCR 1007-2

This document does not include the post-closure monitoring requirements. These requirements are set forth in the Monitoring Plan included as Appendix G of the Phase 2 CAP.

1.2 Document Organization

The remainder of this O&M Plan is organized as follows:

- Section 2.0 contains general information relative to OU 2 and its post-closure O&M.
- Section 3.0 presents the post-closure monitoring and maintenance requirements.
- Section 4.0 identifies the recordkeeping and reporting requirements the post-closure requirements.
- Section 5.0 provides the references used to prepare this O&M Plan.

2.0 GENERAL INFORMATION

This section presents background information on OU 2, the site contact information required by 6 CCR 1007-2, and a description of the post-closure period property use.

2.1 Background Information

OU 2, also known as the Landfill Zone, is located in the south-central portion of Lowry in the City of Denver, Colorado, approximately 5 miles east of downtown Denver and 18 miles east of the foothills of the Rocky Mountains. The location of OU 2 at Lowry is shown on Figure 1. OU 2 is bordered by Alameda Avenue to the south, the Westerly Creek Dam wetlands to the north, Westerly Creek to the east, and the AMLI at Lowry Park apartment complex to the west.

The geology of OU 2 is characterized by unconsolidated materials consisting of thin Quaternary alluvial and eolian (windblown) deposits overlying Denver Formation bedrock of Cretaceous/Tertiary age. The alluvial deposits generally consist of sand and silty sand with interbedded layers or lenses of sandy clay, silty clay, and sandy gravel. Eolian deposits consisting of loess and sand have been documented, primarily at and near the ground surface, in the eastern portion of the landfill. Fill materials of varying depths are present above the alluvium throughout most of OU 2. Fill materials placed in the waste trenches include general municipal refuse and construction debris. These materials have reportedly been placed at depths up to 15 feet, and were subsequently covered with several feet of soil. Refuse was encountered at depths up to 12 feet below ground surface (bgs) in landfill boreholes drilled during site investigations. The ground surface has been significantly influenced by grading activities and contains surface debris in numerous locations.

The Air Force began investigating the Landfill zone in 1983. Investigations continued through completion of MACTEC's pre-design studies in 2003. The results of the pre-design studies are included in the Phase 2 CAP. The results of the other investigations are included in the following documents:

- *Installation Restoration Program Phase I - Records Search, Lowry Air Force Base, Colorado* (Engineering Science, Inc. [ES], 1983
- *Installation Restoration Program Phase II, Confirmation/ Quantification, Stage I, Final Report for Lowry Air Force Base, Colorado* (Dames and Moore, 1987).
- *Installation Restoration Program Final Remedial Investigation Report, Lowry Air Force Base, Colorado* (RI) (Science Applications International Corporation [SAIC], 1990)
- *Installation Restoration Program Final Supplemental Remedial Investigation Report for the Landfill Zone, Lowry Air Force Base, Colorado* (SRI) (Parsons Engineering Science, Inc. [Parsons ES], 1995).
- *Final Operable Unit 2, Landfill Zone, Focused Feasibility Study, Lowry Air Force Base, Colorado* (FFS) (Versar, 1998)

The FFS summarized the previous investigations, described investigation work performed during the FFS, provided a detailed summary of the site characteristics, developed and evaluated 13 alternatives for remediating the site, and recommended a preferred alternative. As OU 2 is a municipal landfill with reported industrial waste that poses a relatively low long-term threat to human health and the environment, the FFS was conducted in accordance with the U.S. Environmental Protection Agency (EPA) presumptive remedy guidance which assumes that a landfill will be closed by capping it, and provides other containment remedies as warranted. The determination that the presumptive remedy approach is applicable for OU 2 was made based upon the site characterization information collected during the OU 2 RI, SRI, and FFS.

Based upon the information included in the FFS, the Air Force issued the *Proposed Plan for Lowry Air Force Base Operable Unit 2 Landfill Zone* (Proposed Plan) (U. S. Air Force, 1998) on May 4, 1998. A copy of the Proposed Plan is included in Appendix A of the Phase 2 CAP.

The Landfill Zone was historically used to dispose of base-wide waste from Lowry Air Force Base. Waste disposal at the site has been estimated to have occurred from approximately 1948 until 1988. Because waste disposal ceased before the effective date of October 9, 1991 for closure under the current Subtitle D regulations, the 1983 CDPHE closure regulations are applicable to the closure of the Landfill Zone. The 1983 CDPHE closure regulations form the basis for the closure design included in the Phase 2 CAP and its appendixes.

2.2 Site Contact

The site contact for the post-closure period is:

Paul Weaverling
Lowry Assumption, LLC
7991 Shaffer Parkway, Suite 100
Littleton, CO 80127
Telephone: 303 972 6633
Fax: 303 972 6655

2.3 Post-Closure Period Property Use

The post-closure period property use will be that of an open space/non-irrigated park. The post-closure period will last for thirty (30) years. Deed restriction and institutional controls for post-closure period are identified in the Phase 2 CAP.

3.0 POST-CLOSURE MONITORING AND MAINTENANCE

This section provides the post-closure monitoring and maintenance requirements. Figures 2 is a site plan showing the OU 2 final grade design and Figure 3 provides the typical cap section that will be constructed. Additional design details are provided in the Phase 2 CAP.

The landfill cap consists of a 6-inch thick Vegetative Layer overlying an 18-inch thick Low Permeability Layer (LPL). The LPL lies over a prepared subgrade comprised of compacted cover soils placed over the landfill prior to 2003 and regarded as part of the landfill closure. As shown on Figure 2, the landfill cap covers an approximate 65 acre area and contains surface water conveyance channels that lead to outfall structures located outside of the landfill cap.

Monitoring will be performed monthly for the first twelve months after placement of the vegetative layer and quarterly thereafter for the remainder of the post-closure period. The monitoring frequency may be modified, with CDPHE approval, during the post-closure period based on the results of the previous post-closure monitoring. Documentation of all monitoring and maintenance activities will be performed as described in Section 4.0.

3.1 Subsidence Areas and Cover Cracking

Because waste material and cover soils can settle, the cap will be monitored for signs of excessive settlement. During the settlement monitoring, the inspector shall walk or drive the landfill surface and note areas of ponding water, surface depressions, cracking of the cover soil, and visible displacement of structures (e.g. soil settling around gas vents or probes).

Additional vegetative layer material will be placed over settled areas to restore grades. The placed soil will be revegetated in accordance with the specifications included as Appendix D in the Phase 2 CAP.

3.2 Burrowing Animals

Burrowing animals may dig holes through the landfill cap and thus disturb the vegetation and also potentially providing a preferential pathway for surface water to infiltrate through the cap. Animal burrows will be backfilled immediately. If the animals are still present, an animal control specialist may be required to remove the animals. Burrows penetrating the LPL will be either be backfilled with LPL material in accordance with the specifications or backfilled with bentonite.

3.3 Surface Water Controls

The surface-water controls include conveyance channels, erosion control matting, and a riprap outlet structure located near the wetlands area. The conveyance channels will be constructed as shown on Figure 2 to route water to the outlet structure and control erosion and sediment discharge. Erosion control matting will be placed over, and in front of, the conveyance channels. A walking inspection of the drainage berms, erosion control matting, and outlet structure will be performed during each monitoring event. Problem areas will be documented as described in Section 4.0 on the Monitoring and Maintenance Activity Reports and graphically depicted, photographed, and repaired, as necessary. At a minimum, these structures will be inspected for signs of excessive erosion, settlement, subsidence, burrowing animals, and blockage. These signs include, but are not limited to, ponding water, gullying, and depressions.

Routine maintenance of the drainage berms and outlet structure will include removing any blockages, filling eroded areas and burrowing animal holes, and repairing other disturbances as necessary. Areas that exhibit excessive erosion may require placement of erosion control material.

Evidence of surficial seepage should also be recorded and reported immediately. Repeated occurrences should be promptly investigated by an engineer experienced in landfill design and construction who will then develop the repair requirements.

There is an area just north of the landfill that has been historically noted as being a potential seep location. This area is noted on the extreme upper end of Drawing G-3 as a "moist area" (pin flag F58). The survey coordinates for this location are also given on Drawing G-3. This area has been observed by MACTEC numerous times during 2003. At times, it contains a soil moisture content visually wetter than the surrounding surface soil. At other times, no discernable difference in moisture content was observed. This area is to be checked during each monitoring event. If standing water is present, it will be sampled and analyzed in accordance with the surface water requirements of the Post-Closure Monitoring Plan.

3.4 Vegetation

The vegetation will be monitored for signs of stress and/or barren areas. During at least the first three years after vegetation of the cover, maintenance of the vegetation will consist of periodic mowing to maintain an evenly distributed 4- to 12-inch stand of grassy vegetation to enhance evapotranspiration, minimize invasion by deep-rooted vegetation, and to help control undesirable weed and bush species. Mowing may be eliminated after successful establishment of a fair to good stand of grassy vegetation. Periodic composting will be applied as necessary to maintain optimum yearly growth on seeded plots and to optimize nutrient concentrations in the soil. Areas where vegetation is disturbed, either by erosion or other means, will be revegetated, as necessary.

3.5 Groundwater and Surface Water Monitoring

As previously stated, groundwater monitoring and the maintenance of groundwater wells are not covered in this O&M Plan. These items are addressed in the Monitoring Plan and included as Appendix G to the Phase 2 CAP. The Monitoring Plan also addresses the surface water monitoring requirements.

3.6 Culvert Extension

An approximate 1,600-foot long high density polyethylene (HDPE) culvert extension with a riprap outfall structure will be constructed where shown on Figure 2. Additional details of the culvert extension design are given in the Phase 2 CAP.

The culvert extension will be inspected for signs of collapse through observing changes in the surface topography above the pipe (i.e., depressions) and the discharge from the pipe (i.e., sediment washing out from the pipe into the outfall structure), and by performing videos of the inside of the pipe throughout the pipe extension. The videos will be performed at least annually for the first five years after installation. The video frequency may be decreased to biannually after the first five years depending upon the maintenance requirements incurred to date. Blockages/debris will be removed from the pipe, pipe outlet, and discharge structure. Excessively eroded areas in the outlet structure will be repaired with additional erosion control materials. Damaged and/or displaced sections of the pipe will be removed and replaced as appropriate to return the pipe to its as-constructed alignment.

3.7 Fences, Gates, and Signage

The fences, gates and signage surrounding the site will be inspected for damage and accumulated debris. The fence will be inspected by walking the fenceline and visually surveying the posts, fasteners, and fabric for damage. If significant accumulated debris (trash, sticks, leaves, etc.) is encountered, the debris will be removed and appropriately disposed. The gates will be checked to ensure that they are working properly and are properly secured. Damaged gates or sections of fence will be replaced by a qualified fencing contractor. Signage will be checked to ensure they are still present at the locations shown on Figure 2 and that the wording is still legible. Damaged, loose, or missing signs will be repaired or replaced as appropriate. The sign installation requirements are shown on Drawing C-15.

3.8 Gas Vents and Probes

The passive gas venting and monitoring system includes 27 monitoring probes and seven gas vents at the locations shown on Figure 2. Design details for the gas vents and probes are shown on the design drawings included in the Phase 2 CAP. The vents and probes will be inspected quarterly to ensure that no damage has occurred and that the vent opening and bug screen are clear of debris. If debris is discovered on the bug screen, it will be thoroughly cleaned or replaced. If debris has piled around the riser pipe and threatens to obstruct the vent opening, the debris will be removed and disposed of properly.

The vents will also be inspected after period of significant snowfall to ensure that snow does not block the vents. If snow has drifted in the area of the riser pipe and obstructs or threatens to obstruct the vent opening, the snow will be removed from a large enough area to minimize the chance of recurrence due to windblown snow.

If an obstruction is present in the vent pipe, it will be removed carefully to avoid the potential of forcing the obstruction further into the pipe. If the obstruction cannot be removed or the vent pipe is damaged, the vent pipe will be removed and replaced.

The probes will be inspected in conjunction with obtaining quarterly gas readings from the probes. The probes will be inspected to ensure that the probe outer and inner casings are intact, that the Teflon tube and shutoff valve are intact and functioning, and that the inner well annular seal is in good condition.

Soil gas levels will be measured and analyzed for methane in each of the 27 gas monitoring probes as described in Section 3.4 of the Monitoring Plan.

4.0 RECORD KEEPING AND REPORTING

Documentation of operation and maintenance activities is essential for verifying that inspections and repairs have taken place and as a tool for tracking problems that arise so that they may be avoided in the future. At least one copy of the following documents will be kept onsite (or at a location mutually agreed upon by LAC, LERA, and CDPHE) as references during the operations and maintenance activities:

- Construction Specifications
- O&M Plan
- QA/QC Plan
- Certification Report
- Record Drawings

Each time an inspection of one of the cap components is performed, the operator is required to fill out a Monitoring and Maintenance Activity Report form. A copy of this form is attached at the end of this section. The form includes places for recording date, time, operator name, area inspected, findings of inspection and recommendations, and actions taken. Additional documentation such as hand sketches and photographs should be attached to the report. Completed forms will be kept onsite (or at a location mutually agreed upon by LAC, LERA, and CDPHE) in a three-ring binder and transmitted as an appendix to an annual maintenance and monitoring report for the OU 2 Landfill Closure. This report will contain a summary of the monitoring and maintenance activities performed that year and will be transmitted to CDPHE by the end of January following each year of post-closure care.

In the Findings of Inspection and Recommendations section of the form, the operator will note method of inspection such as "walked perimeter of cover and visually inspected outfall of culvert extension," and any pertinent information gathered during the inspection such as "cover in good condition except for small erosional pathway appearing near the West Drainage Berm," or "hairline crack noted in Gas

Vent 22." If no action is required, this will be noted in the Action Taken section. If a particular area needs to be checked during the next inspection, it will be noted. If action is required, the contractor name, phone number, action taken, amount and type of material removed, and any analytical results will be recorded.

LOWRY OPERABLE UNIT 2 LANDFILL CAP
DENVER, COLORADO
MONITORING AND MAINTENANCE ACTIVITY REPORT

Date:	Time:
Area Inspected:	Inspected By:

Findings of Inspection and Recommendations

Action Taken

5.0 REFERENCES

Dames & Moore. 1987. *Installation Restoration Program Phase II, Confirmation/ Quantification, Stage I, Final Report for Lowry Air Force Base, Colorado.* January.

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Versar, Inc. 1998. *Final Operable Unit 2, Landfill Zone, Focused Feasibility Study, Volume I, Lowry Air Force Base, Colorado.* May.