Revised November 17, 2021

Parkdale Quarry Expansion

Exhibit E - Reclamation Plan

1. Introduction

The original mining application, the 2008 amendment, and this amendment, all propose surface mining of sand and gravel and quarried granite aggregate at the Parkdale Quarry. Martin Marietta Materials has requested a Mineral Materials Competitive Sale, COC-078119, in order to expand operations at its privately-owned Parkdale Quarry onto adjacent Bureau of Land Management (BLM)-administered lands. The Parkdale Quarry is located in Fremont County, Colorado, approximately 12 miles west of the Town of Canon City, Colorado. Martin Marietta proposes to expand operations generally north onto BLM property in portions of Sections 1, 2, 11, and 12, Township 18 South, Range 72 West, Sixth Prime Meridian (the Mineral Materials Sale Area). The location of the Parkdale Quarry and the onsite areas are shown on the Index Map in Exhibit B.

The currently mined approximate 112-acre gravel extraction area is located between the Arkansas River and Tallahassee Creek. The current approximate 72-acre granite quarry is located on the opposite side (north) of Tallahassee Creek from the gravel extraction area. As part of the amendment process, the mining southern mining limit of the granite quarry on the private land will be moved approximately 900 feet north away from the Arkansas River. The amendment also removes the approximate 3-acre sandstone mining area from the area of permitted mining lands. As amended, mining is expected to disturb approximately 170 acres on the privately-owned portions of the quarry and approximately 700 acres in the BLM Mineral Materials Sale Area over the life of the mine. The Mineral Materials Sale Area is surrounded by an approximate 730-acre buffer that will be included in the mining permit boundaries, but will be left undisturbed. The purpose of the buffer is to provide a separation between the area where mining will occur and surrounding areas open to the public. Activities that create a ground disturbance will be restricted to the Mineral Materials Sale Area. Final mineral processing, loadout, offsite transportation, and associated activities will continue to be performed on Martin Marietta Materials' owned property south of the Mineral Materials Sale Area. Activities that will be conducted on the Mineral Materials Sale Area include:

- Construction and operation of access/haul roads and possible construction of a material handling and conveyor system from the Mineral Materials Sale Area to the processing area on the private land;
- Excavation of mineral materials using explosives and/or heavy duty excavation equipment;
- Loading of mineral materials onto haul trucks and/or an material handling and overland conveyor system for transport to the processing facilities on the adjacent private land;
- Reclamation of disturbed areas in accordance with our reclamation plan, to be approved by BLM and the Colorado Department of Reclamation, Mining, and Safety.

Final reclamation of the Mineral Materials Sale Area, as envisioned, will create a landscape that substantially mimics the landscape currently present in Webster Park, south of and bordering the

Mineral Materials Sale Area. Final reclamation of the alluvial mining area and the granite quarry on the private land will remain water storage, as per the currently approved reclamation plan.

2. Mine Phasing

Mining of the Mineral Materials Sale Area will be performed in five phases progressing generally from west and northwest to southeast. The sixth phase of mining will extend the mining from the BLM land onto the current granite quarry area. The areas expected to be disturbed by the six mining phases are shown on the Parkdale Expansion Mine Plan Maps in Exhibit D. The road used to access the mining area and transport mined materials will be constructed prior to the commencement of Phase 1 mining. A conveyor system may be constructed during the first phase of mining to replace haul trucks for transporting material from the Phase 1, 2, and 3 mining areas. The mine plan and mining phases are designed to minimize the area of disturbed unreclaimed ground, and to minimize the length of time that a piece of ground remains disturbed and unreclaimed. The mine plan and phasing is also designed to minimize viewshed impacts along the Arkansas River/U.S. Highway 50 corridor from the mining operation in the Mineral Materials Sales Area. Viewshed impacts will be minimized by using a technique called "mine from behind" wherein the existing topography acts as a view screen, and where mining of visible elevated areas is conducted from the side away from the viewpoint. Additionally, the sandstone outcroppings along the southern edge of the Mineral Materials Sales Area will remain undisturbed to further screen mining from being visible along the Arkansas River/U.S. Highway 50 corridor.

We anticipate that Phase 1 of the mining process will disturb approximately 81 acres over a period of 15 to 20 years in the area designated as the West Pit. Phase 2 mining will disturb approximately 166 acres over an estimated period of 20 to 40 years in the area designated as the West Central Pit. We estimate that Phase 3 will disturb approximately 228 acres over a period of 25 to 50 years in the area designated as the Central Pit. The Phase 4 will disturb approximately 110 acres over an estimated 15 to 30 year period in the area designated as the East Central Pit. Phase 5 mining will disturb approximately 113 acres in the area designated as the East Pit, and will take an estimated 15 to 25 years. Phase 6 mining will disturb approximately 57 acres of private land and will take an estimated 10 to 20 years to complete. The generalized post-mining topography is shown on the Reclamation Plan Map in Exhibit F. Reclamation activities will begin in a particular part of a pit area when mining is complete in that part of the pit area, and there is no longer a need to access it. Thus, reclamation will be occurring concurrently with mining, in order to minimize the total disturbed acreage.

3. Reclamation

The primary goal for reclamation on the BLM mining area will be to create a topographic and ecological setting that is similar to that of Webster Park and the hillsides surrounding Webster Park, south of the Parkdale Quarry. The landscape of Webster Park is shortgrass prairie on the lowland areas, bordered by hillside/montane areas of mountain scrubland dominated by sagebrush, and mountain mahogany. Reclamation activities proposed for the Mineral Materials Sale Area will result in the replacement of the current pinion-juniper plant community which has encroached on the area with plant communities that more closely resemble predevelopment conditions in the area and that enhance wildlife habitat and habitat diversity, and provide winter forage for bighorn sheep

and mule deer. Since the reclamation activities will be ongoing over the anticipated 100+ year life of the quarry, the restoration will also yield habitat with diverse age-class plant communities. The already mined alluvial area and the granite mining area on the private land portion of the quarry will be reclaimed for water storage in conformance with the technical standards approved as part of the 2008 amendment.

3.1. Structures to Remain After Site Reclamation

Structures that will remain on the site after reclamation is concluded are shown on the Reclamation Plan, Exhibit F, and include the following:

- The bridge across Tallahassee Creek;
- Approximately 7,000 feet of access road;
- The existing metal shop building;
- Structures associated with the Harvey Ranch homestead west of the alluvial pit area;
- A water storage reservoir to be constructed in the northwest part of the current alluvial pit area;
- A water storage reservoir to be excavated in the northern portion of the granite mining area located on private land;
- Railroad tracks and associated infrastructure; and
- Black Hills Energy power lines.

3.2. Grading of Granite Mining Areas

3.2.1. Valley Floor

The Mineral Materials Sale Area currently drains to the south and southwest, with the majority of the runoff from the area flowing to Current Creek and Tallahassee Creek through three main drainage areas, as shown on the Pre-mining Map in Exhibit C. Once mining is completed, the topography of the valley floor created in the mining process will generally slope to the southwest and south, as shown on Reclamation Plan Map in Exhibit F. Drainage channels will be excavated into the valley floor that connect to the three existing main drainages outside the Mineral Materials Sales Area. Excavation of drainage channels will be performed using explosives to loosen the bedrock material, after which, conventional heavy earthmoving equipment will be used to remove the loosened material. The drainage channels will be laid out so as to continue to generally direct water to the three main drainages now draining the proposed granite mining area. The drainage channels will be constructed with a depth, cross-section, and sinuosity similar to that of the natural drainages in Webster Park that feed into the south side of the Arkansas River. Some side drainages will be constructed to better capture and direct runoff within the Mineral Materials Sale Area. The Conceptual Drainage Channel Layout is included in Exhibit F. The Photographs (1) and (2) show the general topography of Webster Park.

A hydrologic and hydraulic analyses was prepared for the granite mining area by Whetstone Associates, which is included as Appendix F of the Environmental Impact Statement (EIS) prepared for the project by the Bureau of Land Management, and is included here as Exhibit E, Attachment 1. That analysis evaluated the three post-mining watershed areas shown in Exhibit F2. Based on the data from the Whetstone analysis, the hydraulic characteristics of the area were plugged into the online open channel flow calculator developed by Dr. Xing Fang in the Department of Civil Engineering, Lamar University found at https://www.eng.auburn.edu/~xzf0001/Handbook/Channels.html. Channel depth was modeled assuming a trapezoidal-shaped channel, an n-value of 0.035 for a channel containing stones and weeds, a channel bottom width of 2.0 feet, channel slopes cut at a 4:1 horizontal to vertical, the maximum flow discharge of 6.93 cfs, and the minimum channel slope of 1.7%. Based on the input data, the required channel to carry the runoff from the area would need to be 0.57 feet deep. However, constructed drainage channels will be made deeper than 0.57 feet to more closely mimic the natural channels in Webster Park, which due to erosion are generally three or more feet deep. Specific drainage channel design will be finalized at the time of reclamation to account for actual site conditions.

Photograph 1 – View of Webster Park looking southwest from the Parkdale Quarry showing the valley topography and natural drainages.

Photograph 2– View of Webster Park looking south from the Parkdale Quarry showing the valley topography and natural drainages.

3.2.2. Benches

Based on conversations with the Colorado Department of Parks and Wildlife staff, we anticipate leaving intermittent areas where mining benches are not backfilled, in order to leave near vertical rock slopes, as they mimic topography that serves as escape habitat for bighorn sheep to avoid predators. The rock slopes on the reclamation benches will typically be approximately 35 feet high, benches will have a width of approximately 30 feet, and a face angle of approximately 80 degrees, except where rock faces will be left for wildlife habitat. Reclamation benches will be backfilled after mining is complete to leave slopes of approximately 1:1 (horizontal to vertical), except where rock faces will be left for wildlife habitat. Not more than 10-percent of the slopes will be left with near vertical faces up to 80 feet in height for wildlife habitat. The distribution of near-vertical rock slopes will be random to present a more natural post-mining appearance. In areas where rock faces will be left for wildlife habitat, the fill in adjacent areas will be feathered into vertical section to provide a more natural appearance

Backfilling of individual benches will be accomplished by regrading and/or backfilling benches to an approximate 1:1 (horizontal to vertical) reclamation slope to generally blend with the surrounding topography. Some areas of bare rock will remain as bare rock and reclamation of areas of bare rock will be limited to that practical for minimizing obvious disturbance. Benches will be backfilled as final mining is completed, and fill will be placed using a bulldozer to grade and compact slope fill material.

3.2.3. Haul Roads

Haul roads will be reclaimed as mining progresses by removing the material used to construct the road during final mining of the area where the road is located. After material used to construct the road is removed, the former road location will be graded to blend with the surrounding area and reclamation would proceed as specified, based on whether the area is a valley floor or bench area.

3.2.4. Reservoir

The reclamation method for the granite quarry area on Martin Marietta's private acreage is unchanged from the 2008 amendment. Martin Marietta intends to use the granite quarry area on its private acreage for water storage after mining is complete. The approximate water surface elevation will be 5790 ft. Benches and highwalls below elevation 5800 ft will not need to be backfilled as they will be underwater once mining is complete and the pit is used as a water storage reservoir. If necessary, some point-plugging of any leakage will be performed through grouting, although no major grouting is anticipated.

Reclamation of the alluvial area will include a reduced size water storage reservoir in the northwestern portion of the pit, as shown on Figure F. General construction specifications for the alluvial water storage reservoir will conform to the Office of the State Engineer specifications, and the construction method set forth in the 2008 Amendment (Amendment 1) of the reclamation permit. Those portions of the pit not used for water storage will be used for disposal of process fines, which will be overlain with a minimum of five feet of compacted construction fill , capped with topsoil as specified in Section 3.3, and then revegetated.

3.3. Topsoil Replacement

Heavily compacted soil surfaces will be ripped to depths varying from 6 to 12 inches, depending upon the degree of compaction prior to the replacement of topsoil. Based on the adjacent Parkdale Quarry, the existing topsoil depth in the Mineral Materials Sale Area generally ranges from 0 inches to 18 inches. Replacement topsoil depths comparable to those prior to mining, or an average of 9 inches evenly placed, will be used.

Prior to reseeding of disturbed areas, topsoil will be placed to achieve a generally uniform thickness; minimize compaction and erosion; and preserve biological, physical, and chemical properties. Where practical, soil will be applied so as to minimize grading requirements and compaction from multiple equipment passes over the area being reclaimed. Final grading will generally be completed parallel to the topographic contour of the area, where safety conditions permit, to minimize erosion and maximize site stability. Ideally, soil will be applied on areas to be seeded less than 30 days prior to seeding.

3.4. Fertilizer Application

Prior to reseeding of disturbed areas, we will contract with a laboratory proficient in the analysis of soils for agricultural purposes. Two composite samples will be collected from the reclamation topsoil at a depth from 0 to 6 inches, and per 1,000 linear feet of bench or 10 acres of valley floor.

Samples will be taken with either a tile spade or soil auger free of foreign substances or rust. No galvanized tools will be used for sample collection. About one quart of material will be collected for each composite sample. The laboratory will be briefed on the following items for each sample or appropriate set of samples:

- Plant species to be established;
- Type of seedbed preparation technique;
- Type of mulching practices;
- Approximate slope;
- Problems or conditions; and
- Future land use.

All samples will be placed in clean polyethylene bags at the time of collection, sealed and delivered to the laboratory as soon as possible. When samples cannot be delivered within 24 hours of collection, they will be air-dried in a "dust free" environment for about 48 hours or as recommended by the laboratory. Samples will be analyzed for:

- pH;
- Potassium (parts per million);
- Texture;
- Electrical conductivity (millimhos per centimeter);
- Percent organic matter;
- Lime estimate;
- NH4-N and N03-N (parts per million);
- Sodium adsorption ratio; and if necessary
- Phosphorus (parts per million)

The fertilizer application concentration will be based on recommendations from the laboratory sample analyses. Fertilizer will be broadcast over the seedbed using hand- operated "cyclone-type" seeders, rotary broadcast equipment attached to construction or revegetation machinery, or using aerial broadcast seeding equipment. Fertilizer broadcast equipment will be equipped with metering devices. Fertilizer application will take place prior to final seedbed preparation treatment to ensure the incorporation of fertilizer into the seedbed. Fertilizer broadcasting operations will not be conducted when wind velocities would interfere with even fertilizer distribution.

3.5. Reclamation Seed Mixtures

The following reclamation seed mixtures are proposed for use in the Mineral Materials Sale Area.

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SOIL STOCKPILE STABILIZATION (26 POUNDS PER ACRE IF BROADCAST)

Species Preferred		**Variety**	**Lbs/Acre**	**PLS/Acre**
Squirreltail	Elymus elymoides	Pueblo	5.0	960,000
Slender wheatgrass	Agropyron dasystachyum	Pryor	10.0	1,500,000
Western wheatgrass	Agropyron smithii	Rosana	6.0	756,000
Sand dropseed	Sporobolus Cryptandrus	CO Ecotype	1.0	5,300,000

ROADS AND QUARRY FLOORS (20 POUNDS PER ACRE IF BROADCAST)

SPECIES		Weight-Percent	Seeds - Percent	Seeds per Pound	Seeds per Pound Mix
Blue Grama Grass	Bouteloua gracilis	11.00%	26.96%	825,000	90,750
Sideoats Grama Grass	Bouteloua curlipendula	18.00%	10.15%	190,000	34,200
SpikeMuhly	Muhlenbergia wrighti	2.00%	9.50%	1,600,000	32,000
Indian Ricegrass	Oryzopsis hymenoides	21.00%	8.79%	141,000	29,810
Sheep's Fescue	Festuca ovina	4.00%	8.08%	680,000	27,200
Sand Dropseed	Sporobolus cryptandrus	0.50%	7.72%	5,200,000	26,000
Thickspike Wheatgrass	Agropyron dasystachyum	16.00%	7.32%	154,000	24,640
Western Wheatgrass	Agropyron smithii	20.00%	7.13%	120,000	24,000
Canby's Bluegrass	Poa canbyi	2.00%	5.50%	925,500	18,510
Purple Three-Awn	Aristida purpurea	1.00%	0.77%	260,000	2,600
Fringed Sage	Artimesia frigida	0.25%	3.34%	4,500,000	11,250
Priare Sage	Artemisia ludoviciana	0.25%	3.34%	4,500,000	11,250
Alfalfa	Medicago sativa	2.00%	1.25%	210,000	4,200
Fourwing Saltbush	Atriplex canescens	1.00%	0.15%	52,000	520
Skunkbush Sumac	Rhus aromatica	1.00%	0.03%	10,600	106

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QUARRY BENCHES (20 POUNDS PER ACRE IF BROADCAST)

SPECIES		Weight-Percent	Seeds - Percent	Seeds per Pound	Seeds per Pound Mix
Blue Grama Grass	Bouteloua gracilis	17.00%	30.73%	825,000	140,250
Sandberg Bluegrass	Poa sandbergii	6.00%	12.17%	925,500	55,530
Sand Dropseed	Sporobolus cryptandrus	1.00%	11.39%	5,200,000	52,000
Sideoats Grama Grass	Bouteloua curlipendula	25.00%	10.41%	190,000	47,500
Sheep's Fescue	Festuca ovina	6.00%	8.94%	680,000	40,800
Indian Ricegrass	Oryzopsis hymenoides	25.00%	7.72%	141,000	35,250
Little Bluestem	Andropogon scoparius	6.00%	3.42%	260,000	15,600
Canadian Wild Rye	Elymus canadensis	3.00%	0.76%	115,000	3,450
Purple Three-Awn	Aristida purpurea	1.00%	0.57%	260,000	2,600
Needle & Thread	Stipa comata	2.00%	0.50%	115,000	2,300
Blanketflower	Gaillardia aristata	2.00%	1.28%	293,000	5,860
Wild Bergamot	Monarda fistulosa	2.00%	0.92%	210,000	4,200
Four-wing Saltbush	Atriplex canescens	1.00%	10.96%	5,000,000	50,000
Mountain Mahogany	Cercocarpus montanus	1.00%	0.13%	59,000	590
Wood's Rose	Rosa woodsi	1.00%	0.08%	35,000	350
Skunkbush Sumac	Rhus aromatica	1.00%	0.02%	10,600	106

3.6. Seeding

Within five days after the application of fertilizer, but prior to seeding, the topsoil will be prepared for seeding by utilizing a disk, harrow or chisel plow to roughen the surface, depending upon site conditions and availability. The topsoil surface will then be left in a roughened condition to inhibit erosion and provide a receptive surface for subsequent reclamation procedures.

Disturbed areas will be revegetated with the approved seed mix. Seeds will come from nursery plant stock grown on the Mineral Materials Sales Area or adjacent Martin Marietta-owned area, or will be obtained in standard containers with seed name; lot number; net weight; and percentages of purity, germination, hard seed, and maximum weed seed content clearly marked for each seed type. Seed supplies will not contain the seeds of any state recognized noxious weed species. A certificate stating that each seed lot has been tested by a laboratory with respect to the above requirements will be delivered with the seed. Only certified seed of named varieties will be used where varieties are specified and can be obtained. Sources for "common" seed will be selected with comparable climatic and elevation characteristics similar to the project's climate and elevation. Legume seed will be inoculated with the correct rhizobium prior to shipping. All legume seed will be planted prior to the expiration date on the inoculum tag or reinoculated within 24 hours prior to planting. For broadcast seeding, seeds will be applied to benches and the valley floor area at a seeding rate of approximately 20 pounds of pure live seed (PLS) per acre which equates to approximately 210 seeds per square foot. Seeds will be applied to stockpiles at a seeding rate of approximately 26 PLS per acre which equates to approximately 104 seeds per square foot. Seed will be broadcast over the seedbed using hand- operated "cyclone-type" seeders, rotary broadcast equipment attached to construction or revegetation machinery, or aerial broadcast (hydroseeding) methods. The valley floor and other relatively large flat expanses may be seeded by seed drilling. If drill seeding is performed instead of broadcast seeding, that application rate will be half that used for broadcast seeding.

3.7. Mulching

In areas under going final reclamation, and where seed is applied by drilling or broadcasting, mulching will be conducted immediately following seeding operations. Straw mulch will be spread evenly by hand or mechanical blower. When mulching slopes, application will be initiated at the top of the slope, working down slope, where possible. Mulch will not be spread when wind velocities would prohibit even material distribution. Straw Mulch will not be musty, moldy, caked, or decayed and will be free of noxious weeds or noxious weed seeds. It will be delivered in an air-dry condition. The majority of stems will be 10 to 12 inches long or longer prior to application if the mulch is to be anchored by crimping. Approximately two tons of mulch per acre will be applied to all areas to be mulched. Mulch will not be applied to stockpiles unless stockpiles are to become a permanent reclamation feature.

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ATTACHMENT 1

HYDROLOGIC AND HYDRAULIC ANALYSES
FROM
ENVIRONMENTAL IMPACT STATEMENT APPENDIX F