National Park Service
U.S. Department of the Interior



Minuteman Missile National Historic Site

Historic Structure Report, Cultural Landscape Report and Environmental Assessment







JUNE 2010

Public Review Draft



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TABLE OF CONTENTS

Chapter 1: Introduction (Purpose and Need)

Scope of the Report..... 1.1
Report Methodology (Applicable Regulatory Requirements)..... 1.2
Purpose and Need for the Project 1.4
Project Objectives 1.4
Park Purpose/Significance..... 1.5
Description of the Study Area 1.7
Environmental Assessment Impact Topics..... 1.8
Impact Topics Selected for Analysis 1.9
Impact Topics Considered but Eliminated from Further Analysis..... 1.10
Recommendations for Further Investigation..... 1.18

Chapter 2: History Summary

Introduction..... 2.1
Preconstruction..... 2.1
Episode 1: Minuteman I (1963-1971)..... 2.8
Episode 2: Minuteman II (1971-1993) 2.11
Episode 3: Deactivation and National Historic Site (1993-Present)..... 2.23

Chapter 3: Existing Conditions/Affected Environment

Introduction..... 3.1
Environmental Context and Natural Systems..... 3.3
Environmental Assessment Impact Topics..... 3.4
Cultural Resources..... 3.4
Existing Conditions: Cultural Landscapes
Delta-01 Landscape Existing Conditions..... 3.4
Description of the Delta-01 Site..... 3.4
Spatial Organization, Delta-01..... 3.9
Land Use, Delta-01..... 3.9
Circulation, Delta-01..... 3.13
Topography and Views, Delta-01..... 3.13
Vegetation, Delta-01..... 3.17
Buildings and Structures, Delta-01..... 3.17
Small Scale Features, Delta-01..... 3.18
Delta-09 Landscape Existing Conditions..... 3.31
Description of the Site, Delta-09..... 3.31
Spatial Organization, Delta-09..... 3.35
Land Use, Delta-09..... 3.35
Circulation, Delta-09..... 3.39
Topography and Views, Delta-09..... 3.39
Vegetation, Delta-09..... 3.43
Buildings and Structures, Delta-09..... 3.43
Small Scale Features, Delta-09..... 3.44
Views to other Missile Sites..... 3.50

Existing Conditions: Architecture
Delta-01 Launch Control Support Building..... 3.55
Exterior Envelope..... 3.55
Interior Finishes..... 3.62

Life Safety and Accessibility…… 3.86
Asbestos Containing Building Materials and Lead Paint……..…….. 3.88
Building Systems…… 3.89
Vehicle Heated Storage Building……..…… 3.90
Exterior Envelope……... 3.91
Interior Finishes……..…… 3.94
Delta-09 Launch Facility……... 3.95
Asbestos Containing Building Materials and Lead Paint…… 3.96

Existing Conditions: Structural
Delta-01 Launch Control Support Building…… 3.97
Delta-01 Launch Control Center (Capsule)…… 3.100
Delta-01 Vehicle Heated Storage Building…… 3.100
Delta-09 Launch Facility……..… 3.100

Existing Conditions: Cathodic Protection
Delta-01 Launch Control Facility, Cathodic Protection…… 3.105
Delta-09 Launch Facility, Cathodic Protection…… 3.106

Socioeconomics…… 3.107
Income…….. 3.108
Economic Resources…… 3.109
Visitor Experience…… 3.110
Park Operations…… 3.112

Chapter 4: Building/Landscape Analysis and Evaluation
Existing National Register Status…… 4.1
Statement of Significance ……..…… 4.1
Period of Significance ……..…….. 4.2
Historic District Boundary Description……..…… 4.2
Landscape Analysis Methodology……..…… 4.3
Landscape Analysis, Delta-01…… 4.6
Landscape Analysis, Delta-09…… 4.21
Buildings Analysis…… 4.34
Building Analysis, Delta-01……..…… 4.34
Building Analysis, Delta-09……..…… 4.37

Chapter 5: Management Philosophy and Management Issues
Cultural Landscape and Structures Management Philosophy…….. 5.1
Management Issues Related to the Overall Park…… 5.6
Management Issues Related to Delta-01…… 5.6
Management Issues Related to Delta-09…… 5.7

Chapter 6: Treatment Alternatives

Overview…… 6.1
Delta-01 Current Treatment (No Action Alternative)…… 6.2
Spatial Organization Current Treatment…… 6.2
Land Use Current Treatment…… 6.2
Circulation Current Treatment…… 6.2
Topography and Views Current Treatment…… 6.3
Vegetation Current Treatment…… 6.3
Small Scale Features Current Treatment…… 6.3
Buildings and Structures Current Treatment…… 6.3
Delta-09 Current Treatment (No Action Alternative)…… 6.3
Spatial Organization Current Treatment…… 6.3
Land Use Current Treatment…… 6.3
Circulation Current Treatment…… 6.3
Topography and Views Current Treatment…… 6.4
Vegetation Current Treatment…… 6.4
Small Scale Features Current Treatment…… 6.4
Buildings and Structures Current Treatment…… 6.4

Preferred Alternative Goals…… 6.4
Delta-01 Preferred Alternative…… 6.4
Spatial Organization Preferred Alternative…… 6.4
Land Use Preferred Alternative …… 6.4
Circulation Preferred Alternative …… 6.5
Topography and Views Preferred Alternative …… 6.5
Vegetation Preferred Alternative …… 6.5
Small Scale Features Preferred Alternative …… 6.7
Buildings and Structures Preferred Alternative …… 6.8
Delta-09 Preferred Alternative …… 6.19
Spatial Organization Preferred Alternative …… 6.19
Land Use Preferred Alternative …… 6.19
Circulation Preferred Alternative …… 6.19
Topography and Views Preferred Alternative …… 6.19
Vegetation Preferred Alternative …… 6.23
Small Scale Features Preferred Alternative …… 6.23
Buildings and Structures Preferred Alternative …… 6.24

Summary of Alternatives…… 6.29
Mitigation Measures…… 6.32
Environmentally Preferred Alternative…… 6.33

Chapter 7: Impacts from Treatment Alternatives/Environmental Consequences

Environmental Consequences..... 7.1
Comparison of Impacts..... 7.2
Cumulative Impacts..... 7.2
Impairment Analysis..... 7.3
Impacts to Cultural Resources..... 7.4
- Basis for Analysis..... 7.4
- Cultural Resources..... 7.5
- Current Treatment/No Action Alternative..... 7.6
- Preferred Alternative..... 7.9

Impacts to Socioeconomics..... 7.13
- Basis for Analysis..... 7.13
- Current Treatment/No Action Alternative..... 7.13
- Preferred Alternative..... 7.14

Impacts to Visitor Experience..... 7.15
- Basis for Analysis..... 7.15
- Current Treatment/No Action Alternative..... 7.15
- Preferred Alternative..... 7.17

Impacts to Park Operations..... 7.18
- Basis for Analysis..... 7.18
- Current Treatment/No Action Alternative..... 7.18
- Preferred Alternative..... 7.19

Chapter 8: Project Phasing and Class "C" Cost Estimates [not included in this draft]

Chapter 9: Consultation and Coordination

Internal Scoping..... 9.1
External Scoping..... 9.1

Bibliography

Appendix A: Paint Analysis Report

Appendix B: Code Analysis

Appendix C: Treatment Alternatives Considered and Dismissed

Appendix D: Asbestos Surveys

Chapter 1: Introduction

Chapter 1: Introduction

The Minuteman Missile National Historic Site (NHS), located in southwestern South Dakota, preserves one of the last remaining Minuteman II intercontinental ballistic missile systems in the United States. The site interprets the deterrent value of the land-based portion of America's nuclear missile defense during the Cold War era and commemorates the people and events related to this key period of American history.[1]

The national historic site resources consist of the Delta-01 (Launch Control Facility) and Delta-09 (Launch Facility) sites. These facilities have changed little since President George H. W. Bush ordered the stand-down of nuclear forces following the signing of the Strategic Arms Reduction Treaty (START) on July 31, 1991.

The current draft of this report provides a public review version of Parts I and II. Part I includes a historical overview, existing conditions/affected environment, and analysis and evaluation of historic landscapes and buildings. Part II consists of: Management Philosophy and Management Issues, Treatment Alternatives, Impacts from Treatment Alternatives/Environmental Consequences, Consultation and Coordination, and a Bibliography. Chapter 8, Class "C" Cost Estimates, is not included in the current draft. When the preferred alternative has been accepted by the National Park Service, the cost estimates will be added to the report. This draft has been prepared by a project team consisting of Quinn Evans Architects (QEA), Fitzpatrick Structural Engineering (FSE), and Woolpert, Inc., to fulfill a contract with the Midwest Regional Office of the National Park Service.

Scope of the Report

The intent of this combined Historic Structures Report, Cultural Landscape Report, and Environmental Assessment (HSR/CLR/EA) is to provide an overview of the site history, document existing conditions, evaluate integrity, and guide treatment and use of the resources associated with the significant historic landscape and buildings within Minuteman Missile National Historic Site. A thorough investigation and evaluation of the historic landscapes and buildings has been conducted using the Secretary of the Interior's Standards.[2] The documentation of historic significance and evaluation of integrity of the buildings and historic landscapes provides a framework for the development of treatment recommendations. The report will provide site managers with a comprehensive understanding of the physical evolution of the historic buildings and landscapes and guidance for their future management.

[1] National Park Service, "General Management Plan/Environmental Impact Statement, Minuteman Missile National Historic Site," 3.
[2] National Park Service, "Secretary of the Interior's Standards for the Treatment of Historic Properties."

Report Methodology (Applicable Regulatory Requirements)

This report has been prepared according to federal guidelines addressing cultural landscape reports, historic structures reports, and environmental assessments including: *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques, The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes, Preservation Brief 43: The Preparation and Use of Historic Structure Reports,* federal regulations (40 CFR 1500-1508) implementing the *National Environmental Policy Act of 1969* (NEPA), regulations of the *Council on Environmental Quality* (40 CFR 1508.9), *NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-Making,* and the *National Historic Preservation Act of 1966* (as amended). Other applicable regulatory requirements include: the *National Park Service Organic Act,* the *American Indian Religious Freedom Act,* the *Act for the Preservation of American Antiquities of 1906,* the *Historic Sites Act of 1935,* the *National Park Service Director's Order #28, Cultural Resource Management,* and the *Archeological Resources Protection Act.*

The *General Management Plan/ Environmental Impact Statement* (GMP/EIS) for Minuteman Missile National Historic Site provides clear direction for future management of the park, including buildings and sites. The GMP/EIS thoroughly evaluated four treatment alternatives that included use of the buildings and sites associated with the park. The preferred alternative from the GMP/EIS provides specific guidance for the programming of the buildings and landscapes at Delta-01 and Delta-09, and serves as a foundation for the HSR/CLR/EA. Possibilities for treatment of the buildings and landscapes were scrutinized according to the GMP/EIS preferred alternative. This led to the elimination of HSR/CLR/EA alternatives that did not completely meet the GMP/EIS requirements and the ultimate evaluation of only one viable action alternative as part of the HSR/CLR/EA.

The recent *Historic Resources Study* (HRS) for Minuteman Missile National Historic Site provides substantial background information regarding the facilities.[3] This information is not repeated herein; rather, a historic summary (founded on the HRS) and chronological timeline of the physical development of the two units is included to document changes made to the properties related to periods of significance. Additional primary documentation was gathered from the archival collections at Minuteman Missile National Historic Site (stored at Badlands National Park) and Ellsworth Air Force Base in June of 2008. Maps illustrating physical changes over time are provided.

Conditions surveys have been conducted on the buildings, systems, and landscapes at each facility. These are described in the existing conditions section, Chapter 3, which includes assessments of the overall condition of the properties and the condition of

[3] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study).

individual buildings, structures, and landscape features. Field inventories of existing conditions were conducted by Quinn Evans | Architects in June 2008 and June 2009.

Although the federal government has standards for the preparation of Historic Structures Reports, Cultural Landscape Reports, and Environmental Assessments, there are no guidelines for preparing these reports in combination. Merging the documents requires some adjustments to the standard formats for each, to streamline the presentation and legibility of the document. This report is organized into two parts and nine chapters. The current submittal includes the 95% draft of chapters one through nine, excepting chapter eight.

Part I

Chapter 1: Introduction (Purpose and Need)
Chapter 2: History Summary
Chapter 3: Existing Conditions/Affected Environment
Chapter 4: Building/Landscape Analysis and Evaluation

Part II

Chapter 5: Management Philosophy and Management Issues
Chapter 6: Treatment Alternatives
Chapter 7: Impacts from Treatment Alternatives/Environmental Consequences
Chapter 8: Class "C" Cost Estimates
Chapter 9: Consultation and Coordination
Bibliography

The *Environmental Assessment (EA)* portions of the report analyze the impacts of each of the treatment alternatives on natural and cultural resources. The EA portion of the project has been coordinated by Woolpert, Inc., a consulting firm that specializes in environmental planning. Quinn Evans Architects assisted in the preparation of this portion of the report.

Purpose and Need for the Project

The purpose of this report is to provide information regarding the physical development, existing conditions and analysis of integrity for the buildings and landscape features within the two units of the Historic Site. The report provides treatment recommendations, and cost estimates for the historic landscapes and structures at the Delta-01 and Delta-09 sites. Finally, an Environmental Assessment is included to meet National Environmental Policy Act (NEPA) requirements. Prior to the completion of this report, little information was available about the cultural landscapes at Minuteman Missile National Historic Site. This report provides critical information to help plan the preservation and management of the park's resources, including condition assessments and baseline documentation and analysis of integrity and significance for the landscapes and buildings of the missile sites.

The HSR/CLR/EA is needed to determine how best to achieve four major goals for the park. These include: preserving the integrity of the cultural resources within the park, improving the visitor experience at the park, providing expanded facilities for visitors, and enhancing interpretive opportunities related to the historic resources.

Project Objectives

The overall goal of this combined Historic Structures Report, Cultural Landscape Report, and Environmental Assessment (HSR/CLR/EA) is to provide an overview of the history, document existing conditions, evaluate integrity, and guide treatment and use of the resources associated with the significant historic buildings and landscapes within Minuteman Missile National Historic Site.

Specific objectives of the report include:

Part I

1. Evaluation of viewsheds from and to Delta-01 and Delta-09.
2. Assessment of conditions of modern building materials and systems.
3. Documentation of physical changes that illustrate shifting responses to military technology. Include documentation of phases of physical change to the landscapes and buildings.
4. Identification of missing features.
5. Identification of changes in paint schemes and interior/exterior finishes and small scale features such as security elements, antennae, structures and fence configurations.
6. Identify contributing and non-contributing landscape characteristics.

Part II

1. Recommended approach for site interpretation, including placement of wayside exhibits and site signage.
2. Development of schematic site planning for providing visitor services (including universal access, parking, pedestrian circulation, and restroom facilities).
3. Recommendations for addressing missing building or landscape features.
4. Recommended approach(es) for maintaining or replacing mid to late 20th century building materials and systems.
5. Recommended method for maintaining historic HVAC and Cathodic protection systems.
6. Recommendations for paint schemes and interior/exterior finishes and treating small scale features such as security elements, antennae, structure and fence configurations.
7. Recommendations for protecting significant views.
8. Recommendations for vegetation management and control.
9. Recommendations for erosion control at Delta-01 and drainage at Delta-09.
10. Recommendations for interpreting the overall missile project, other missile sites and the historic connection between Delta-01 and Delta-09.

Park Purpose and Significance

The purpose of Minuteman Missile National Historic Site is to

- preserve, protect, and interpret for the benefit and enjoyment of present and future generations the structures associated with the Minuteman II Intercontinental Ballistic Missile (ICBM) system,
- interpret the historical role of the Minuteman II Intercontinental Ballistic Missile (ICBM) system as a key component of America's strategic commitment to preserve world peace, and in the broader context of the Cold War, and
- Complement the interpretive programs relating to the Minuteman II Intercontinental Ballistic Missile (ICBM) system offered by the South Dakota Air and Space Museum at Ellsworth Air Force Base.

Minuteman Missile National Historic Site was nominated for inclusion in the National Register of Historic Places upon congressional authorization and presidential signature of its enabling legislation dated November 29, 1999. On May 5, 2005, a thorough National Register Nomination was completed. The nomination includes identification of historic district boundaries and contributing features. The nomination also establishes a national level of significance for Minuteman Missile National Historic Site. The nomination recognizes important elements of the sites including associated features, recreational

equipment, mechanical and electrical equipment, historic objects, furnishings, and landscape elements.

Minuteman Missile National Historic Site is significant because of the following:

- The Minuteman II intercontinental ballistic missile (ICBM) facilities known as Delta-01 and Delta-09 are the best preserved examples of the operational character of American history during the Cold War.
- The facilities are symbolic of the dedication and preparedness exhibited by the missileers of the U.S. Air Force stationed throughout the upper Great Plains in remote and forbidding locations during the Cold War.[4]
- The facilities provide a unique opportunity to illustrate the history and significance of the Cold War, the arms race, and ICBM development.
- Delta-01 and Delta-09, as represented through the 44th Strategic Missile Wing, highlight the traditional values, training, and ésprit de corps of military personnel from the U.S. Air Force, the Strategic Air Command, and Ellsworth Air Force Base, and their undeterred commitment to defend the country.
- The facilities represent unparalleled engineering feats and collaboration between military personnel and civilian contractors in the design, construction, activation, and maintenance of the upper Great Plains missile fields.
- Delta-01 and Delta-09 remain as examples of the ability of the American people to construct, in a short period of time, complex facilities that would not only serve as a protection against others that have similar power but also to withstand the test of time.
- Although the Minuteman system was a catalyst for rural electrification, road improvements, and economic development, the facilities also exemplify the historic concerns among rural South Dakota communities and ranchers towards landownership issues and potential disruptions of their traditional "western" way of life.
- The facilities offer the opportunity for civic engagement, discussion, and debate on past, present, and future ramifications of the Cold War era and the country's missile defense program.
- Delta-01 and Delta-09 allow access, for national and international visitors, to seldom-seen military technology and the powerful tangible cultural resources that may have had a profound impact upon their political and social ideals.[5]

[4]Although the term **missileer** is most often used to refer to the operations officers on 24- hour alert in the underground capsules responsible for launching the missiles, in the broader context it includes the missile maintainers, security forces, chefs, civil engineers, communications personnel, and others that directly supported the strategic alert mission.

[5] These are taken from the Minuteman Missile NHS "Draft General Management Plan/Environmental Impact Statement," pp. 9-10.

Description of the Study Area

The region surrounding the Minuteman Missile NHS includes numerous visitor destinations including Mount Rushmore National Memorial, Badlands National Park, Black Hills National Forest, Jewel Cave National Monument, Custer State Park, and Deadwood National Historic Landmark. The two Delta sites are located approximately ten miles north of Badlands National Park, which is about seventy miles east of Rapid City, South Dakota. Both Delta sites are adjacent to Interstate 90, which is a major east-west tourist route. The nearest communities are Cactus Flats to the east at Interstate 90 Exit 131, and Wall to the west at Interstate 90 Exit 110.

The landscape within view of the Delta sites and the highway between them consists of rolling ranch land with steep badland rock formations in the background. Billboards, utility poles and lines, an occasional house, outbuilding, or fenced area, and road signs along the highway are the few other features within sight. In addition to the Delta-01 and -09 facilities, the general area includes visible remnants of other Minuteman Missile sites that may be interpreted to assist visitors in comprehending the overall contextual background of the National Historic Site.

The Launch Control Facility, Delta-01, is situated on a 6.35-acre site and includes two support buildings aboveground and one belowground facility. Delta-01 is in Jackson County, about one-half mile north of Interstate 90 on County Road CS23A at exit 127. The site is bordered on the north, west, and south sides by private property and on the east by a county road and the Buffalo Gap National Grassland.

Delta-09, the Launch Facility, contains a training model of a Minuteman II missile in its silo and an underground utility support building. The 1.5-acre site includes a viewing enclosure allowing visitors to see the model missile. Delta-09 is about eleven miles west of Delta-01 in Pennington County, about three quarters of a mile south of Interstate 90 Exit 116 on 239th Street. Delta-09 is bordered on the north, west, and south by the national grassland and on the east by private property.

The temporary NPS project office housing the superintendent and staff is located on private property in Cactus Flats, just south of exit 131 on Interstate 90. The eventual location for the park headquarters and visitor center will be at the northwestern corner of exit 131 on Interstate 90.

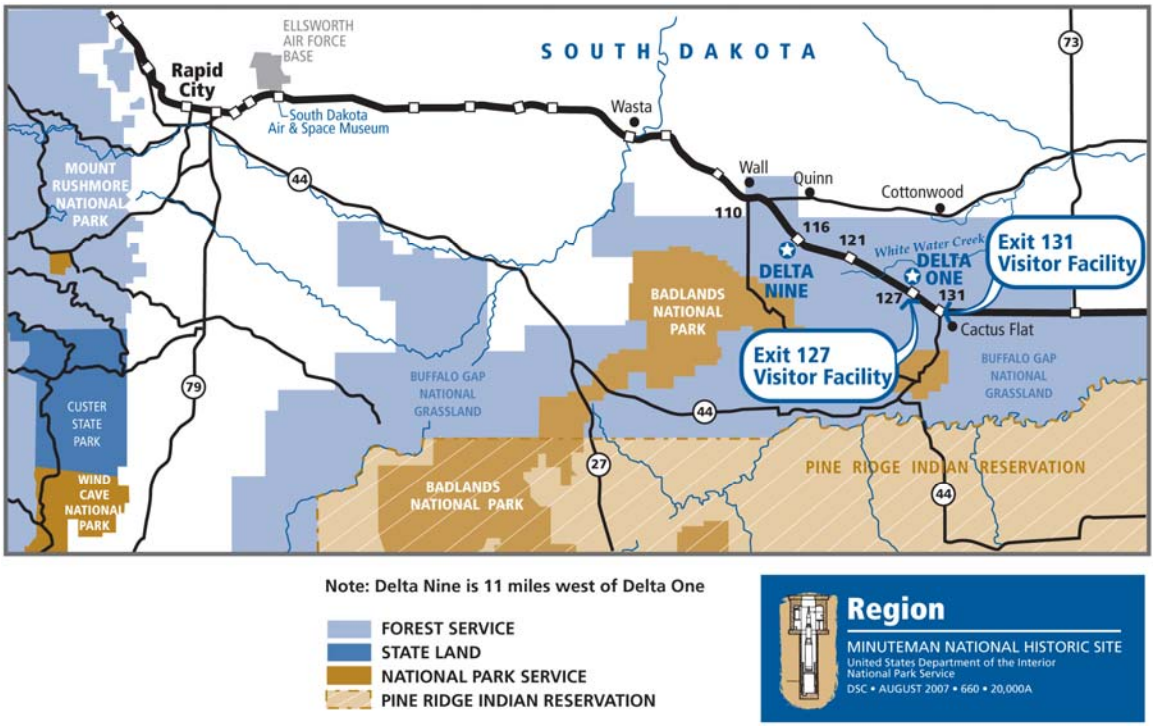


Figure 1- 1: Location map of Minuteman Missile NHS
(source: Minuteman Missile NHS Draft General Management Plan, page 7).

Environmental Assessment Impact Topics

The NPS manages park resources to maintain them in an unimpaired condition for future generations in accordance with the NPS-specific statutes, including the Organic Act of 1916 and the National Parks Omnibus Management Act of 1998, general environmental laws such as the Clean Air Act, the Clean Water Act, the Endangered Species Act of 1973, NEPA, and the Wilderness Act, Executive Orders, and applicable regulations. NEPA is the basic national charter for protection of the environment. NEPA requires federal agencies to use all practicable means to restore and enhance the quality of the human environment and to avoid or minimize any possible adverse effects of their actions upon the environment.

Specific impact topics are identified for analysis and to allow comparison of the environmental consequences of each alternative. Impact topics that are analyzed for this project are: cultural resources (cultural landscapes, historic buildings and structures), socioeconomics, and visitor experience and park operations. Impact topics that were dismissed from further analysis for this project are: geology and soils, paleontological resources, archeological resources, prime and unique farmlands, floodplains, water quality, wetlands, air quality, environmental justice, soundscape management, lightscape

management, Indian trust lands, ethnographic resources, museum collections, special status species and wildlife.

These impact topics were identified based on federal laws and regulations, including Section 106 of the *National Historic Preservation Act of 1966* (as amended) and Executive Orders, NPS *Management Policies 2006*, and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact Topics Selected for Analysis

Cultural Resources

Minuteman Missile NHS is listed in the National Register of Historic Places. The environmental analysis will include buildings, structures, and landscape characteristics (spatial organization, circulation, land use, vegetation, topography, buildings, structures, small-scale features, and views).

Implementation of any treatment alternative could affect cultural resources at Minuteman Missile NHS; therefore this topic will require analysis in this document.

Socioeconomics

Tourism as a component of the regional economy of Jackson and Pennington Counties is growing and the retail and government sectors are important for employment of local residents. Substantial contributors to the tourism revenue in the region include Wall Drug, Minuteman Missile NHS, Badlands National Park, the Black Hills, the Lakota Heritage and Education Center and other area attractions. Potential treatments to the historic structures and cultural landscapes of Minuteman Missile NHS, when evaluated within the greater context of the region, could have effects on the regional economy; therefore, this topic will be addressed in this document.

Visitor Experience

Although Minuteman Missile NHS is a relatively new NPS unit, site staff provide ranger-led interpretation at both sites and operate a visitor information desk at the temporary Visitor Contact Station and park headquarters at exit 131 of Interstate 90. The NPS has recently completed a Long-Range Interpretative Plan for the park and the implementation of this plan has been initiated.

Because implementation of any treatment alternatives could affect the visitor experience at Minuteman Missile NHS this topic will be addressed in this document.

Park Operations

Minuteman Missile NHS is open year-round, although there are few visitors during the winter. Park staff are currently based in the temporary park headquarters, which is approximately four miles east of Delta-01 and approximately 15 miles east of Delta-09. Implementation of potential treatment alternatives could affect staffing levels, logistics and costs for maintenance and interpretation at Minuteman Missile NHS; therefore, this topic will be addressed in this document.

Impact Topics Considered But Eliminated from Further Analysis

Geologic Features and Soils

Bedrock in northern Jackson County is within the Pierre Shale Formation with loamy terraces occurring as mesas and tableland. Bedrock in northeastern Pennington County is composed of the Pierre and Fox Hills formations. Because the proposed action would not disturb bedrock, there would be no impacts to geologic resources. Therefore, further analysis of geology will be dismissed from this document.

Soils at the Delta-01 site consist of Nunn loam and Pierre Clay. At the Delta-09 site, Whitewater clay underlies the area. Because proposed cultural landscape treatment alternatives would result in short-term, direct negligible impacts, further analysis of soils will be dismissed from this document. However, all soil disturbing activities are subject to applicable regulations, including the National Pollutant Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plan (SPPP) requirements, such as implementation of NPS Best Management Practices (BMPs).

Cultural Resources

Paleontological Resources

There are no known paleontological resources at Minuteman Missile NHS. As noted in the archeology discussion the construction of the facilities at Minuteman Missile NHS resulted in extensive ground disturbance in and around the site. The actual limits of ground disturbance are not known, but ground disturbance would certainly have extended beyond the current perimeter fence for both Delta-01 and Delta-09. Surveys and literature searches would be conducted prior to any ground disturbance for construction of parking lots, cathodic protection or other cumulative actions such as the visitor center, which is proposed in the Minuteman Missile NHS General Management Plan. If any significant resources are found then mitigation measures would be implemented. The project would be redesigned or relocated to avoid any impacts to the resource. If the project could not be redesigned or relocated, then data recovery would be conducted and the resources would be curated at an appropriate facility. If surveys and literature searches reveal no

resources within the project area then there would be no impact to the resource. If resources are identified the negative impacts would be mitigated through redesign, relocation of the project or data recovery. The resulting mitigated impacts would be minor, therefore paleontological resources were dismissed from further analysis in this report.

Archeological Resources

Construction of aboveground and subsurface facilities at Delta-01 and Delta-09 required extensive excavation and ground disturbance in the immediate vicinity of each site. Although the exact extent of ground disturbance is unknown, some area beyond each site's perimeter fence was likely disturbed. Due to the extensive disturbance of Delta-01 and Delta-09 it is unknown if any archeological sites existed at these locations prior to construction and those construction activities would have completely destroyed any resources, if they existed. The potential for historic archeological resources resulting from daily military operations would likely be very limited because virtually all materials on the ground would have been removed to maintain the site to military standards. Taking cumulative actions into consideration would include the potential for construction of a visitor center at a site southeast of Delta-01. The Preferred Alternative in the Minuteman Missile NHS General Management Plan identified an area north of Exit 131 for the visitor center.

Any ground disturbance resulting from treatment alternatives proposed in this report, in addition to any cumulative actions such as construction of a visitor center would be addressed through the NHPA Section 106 consultation process. Archeological surveys of the proposed areas of ground disturbance would be conducted as part of that process. If archeological resources eligible for listing in the National Register of Historic Places are found, then, as part of the Section 106 process, mitigation measures would be identified. The NPS and the South Dakota SHPO would consult on the mitigation measures and work toward agreement on those measures. Because archeological inventories would be conducted and Section 106 consultation would be implemented for any ground disturbing action associated with the preferred alternative, archeological resources was dismissed from *further* analysis in this report.

Ethnographic Resources

Ethnographic resources are defined by the National Park Service as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. The preparation of the General Management Plan for Minuteman Missile National Historic Site included consultation with Native American tribes with cultural affiliations with the land in the vicinity of Delta-01 and Delta-09. The tribes expressed no issues or concerns with the proposed use of Delta-01 or Delta-09. The National Park Service has conducted an ongoing process for acquiring the stories and personal histories of military personnel, construction workers and others that have knowledge of daily

operations and management of Delta-01 and Delta-09. This knowledge is invaluable in determining management direction to ensure the resources at Delta-01 and Delta-09 best represent the conditions that make this site important to this era of United States history. The HSR/CLR/EA will be provided to affiliated Native American tribes, and individuals and organizations with ethnographic ties to military operations at Delta-01 and Delta-09 for review and comment. This consultation process is described in Chapter 9: Consultation and Coordination. Treatment alternatives in the HSR/CLR/EA would take relevant ethnographic information into consideration to avoid adverse impacts to these resources; therefore, this topic was dismissed from further analysis.

Museum Collections

The museum collection for Minuteman Missile NHS currently stands at 54,479 objects and archived materials and will likely grow in the coming years. Currently museum objects are at Delta-01 and Delta-09 or in storage at Ellsworth Air Force Base and Badlands National Park. Over time, the museum objects will be removed from Ellsworth Air Force Base and Badlands National Park and brought to Minuteman Missile NHS for interpretive purposes. Other materials will be stored in the Museum Collection Storage Building at Badlands National Park. The preferred alternative in the Minuteman Missile National Historic Site General Management Plan proposes construction of a visitor center for Minuteman Missile National Historic Site; however, this visitor center would not include a curatorial facility to accommodate museum objects. In addition to Badlands NP storage facilities, Mount Rushmore National Memorial also serves as a multi-park storage facility. Although the park's collections will continue to grow, it is not anticipated that implementation of any treatment alternative would result in a large number of new items that require storage and curation in excess of current and proposed storage capacity. Implementation of any treatment alternative would result in negligible impacts to museum collections; therefore, this topic has been dismissed from further analysis in this document.

Prime and Unique Farmlands

In August 1980, the Council on Environmental Quality (CEQ) directed that Federal agencies assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) as prime or unique. Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed, unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the NRCS, there are no prime or unique agricultural soils at Minuteman Missile NHS. Therefore, this topic was dismissed from further consideration in this document.

Air Quality

Minuteman Missile NHS does not conduct air quality monitoring. The effects of air pollution on this park's natural resources and historic structures are unknown. Badlands National Park, which is in proximity to Minuteman Missile NHS, does monitor air quality and the air quality in the park is considered good. However, there have been impacts to air quality in and near Badlands National Park in the past including occasional short-term air pollution from wildfire smoke and blowing dust. Local air quality could be temporarily affected by dust and vehicle emissions during the period of construction for any alternative; however, appropriate BMPs would be implemented to mitigate potential short-term impacts to localized air quality. Implementation of treatment alternatives would result in negligible impacts to cumulative sources of air emissions. Therefore, air quality is not addressed as an impact topic in this document.

Floodplains

Executive Order 11988 (Floodplain Management) directs Federal agencies and their actions to avoid to the extent possible the long-term and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

As floodplains do not occur within the project area, floodplains will be dismissed as an impact topic in this document.

Wetlands

Section 404 of the Clean Water Act (CWA) and Executive Order 11990 requires federal agencies to avoid impacts on wetlands where possible. The NPS *Management Policies 2006*, section 4.6.5, *Wetlands* and DO-77-1 (Wetland Protection) provide guidelines on developments proposed in wetlands.
No wetlands have been delineated, nor are there any areas that meet the definition of wetlands within the Delta-01 and Delta-09 project sites. Implementation of proposed treatment alternatives would not impact wetlands; therefore, wetlands will not be addressed in this document.

Water Quality

Section 404 of the CWA also requires federal agencies and their actions to avoid impacts to "other waters of the U.S.," which includes lakes, ponds, streams, and rivers. There are no USGS-mapped streams or rivers within the boundaries of Minuteman Missile NHS. There are intermittent streams in the vicinity of Delta-01 and Delta-09; however, direct impacts to those streams are not planned. Also, because soil disturbing activities are subject to applicable regulations, including the National Pollutant Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plan (SPPP) requirements, such as implementation of NPS Best Management Practices (BMPs), any indirect effects to surface water quality will be minimized. Therefore, water quality will not be addressed in this document.

Environmental Justice

Under a policy established by the Secretary of the Interior, to comply with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,* departmental agencies should identify and evaluate, during the scoping and/or planning processes any anticipated effects, direct or indirect, from the proposed project or action on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks.

Although there are residents in the region that are minority and low income, any proposed treatment alternative would not result in disproportionally direct or indirect impacts on minority or low-income populations. As discussed in the Socioeconomics section, there could potentially be positive impacts to the region as a whole, which could then benefit minority and low-income populations. Therefore, environmental justice will not be included as an impact topic in this document.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaskan Native tribes.

There are no Indian trust resources at the park. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit on Indians due to their status as Indians. Therefore, Indian trust resources are dismissed as an impact topic in this document.

Lightscape

In accordance with NPS *Management Policies 2006*, the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Minuteman Missile NHS is located within a rural setting with minimal ambient light. Existing light sources are limited to security lighting associated with Delta-01 and Delta-09 and vehicles on Interstate 90 and county roads. Military personnel stationed at Delta-01 would have been exposed to very similar levels of human caused light.

Other than lighting associated with safety and security at each site, there are no sources of light associated with treatment alternative; therefore, lightscape management was dismissed as an impact topic in this document.

Soundscape

In accordance with NPS *Management Policies 2006* and Director's Order #47, *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and duration of human-caused sound considered acceptable varies among NPS units, as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Human-caused noise at Delta-01 and Delta-09 is what a visitor would expect from a rural area. Visitors should expect to hear occasional sounds from vehicle traffic along Interstate 90 and the roads leading to each site. Military personnel stationed at Delta-01 would have been exposed to very similar levels of human caused noise. Construction associated with any treatment alternative would be consistent with the normal background of noise of a rural area and would only occur during length of construction. Therefore, soundscape management was dismissed as an impact topic in this document.

Special Status Species

According to correspondence from the U.S. Fish and Wildlife Service (USFWS) in 2002, the federally-endangered whooping crane and least tern and the federally-threatened bald eagle were listed to occur in Jackson and Pennington Counties. However, since 2002, the bald eagle has been delisted. The 2002 letter also listed the federally-listed black footed ferret as possibly occurring in these counties.

The latest USFWS species list for Pennington and Jackson Counties (dated September 2008) was also reviewed to determine the potential presence of listed species. The current

list notes the Federally-endangered whooping crane in Jackson County and Pennington County and the Federally-endangered least tern in Pennington County. The black footed ferret is listed as a known, but proposed/experimental population in both counties.

In addition to federally-listed species, NPS Management Policies and Director's Order 77 Natural Resources Management Guidelines require the NPS to examine the impacts on state-listed threatened, endangered, candidate, rare, declining and sensitive species. Potential impacts to special status species or their habitats were evaluated based on species presence and the potential effects of actions related to treatments to the cultural landscape at the Minuteman Missile NHS. An updated request for information on the presence of state-listed species was submitted to the state of South Dakota in March 2010 and a response has not yet been received. However, based on the 2008 EIS/GMP, the whooping crane, peregrine falcon, and black footed ferret are noted to be listed as a state endangered species. The mountain lion is noted to be listed as a state threatened species.

The black-footed ferret *(Mustela nigripes)* is listed by the state government as endangered and is one of the most endangered mammals in North America. In 1987 only 18 individuals survived. An aggressive captive-breeding and reintroduction program has made progress in recovering the ferret population. There are no known ferrets on or near either of the locations proposed for the visitor/ administrative facility or at or near Delta One or Delta Nine because there are no prairie dog towns (the ferrets' primary habitat) near these sites.

The federally and state endangered whooping crane *(Grus americana)* is a migrant that uses shallow, sparsely vegetated wetlands, wet meadows, and agricultural fields. No actions are being proposed in the alternatives proposed in this management plan that would be expected to detrimentally affect the areas that the cranes use. With their very limited use of the area, no impacts are expected to occur to whooping cranes under any of the alternatives under consideration.

The peregrine falcon *(Falco peregrinus)* is listed by the state as endangered. The peregrine falcon lives mostly along mountain ranges, river valleys, coastlines, and increasingly in cities where they launch attacks on their prey from cliff-like perches. The national historic site does not include suitable nesting habitat for the falcon. Therefore impacts on the peregrine falcon are not anticipated.

The mountain lion *(Felis concolor)*, a state-listed threatened species, is believed to be expanding out from the Black Hills. However, mountain lions are not believed to frequent the national historic site. There have been only 37 documented mountain lion observations in nearby Badlands National Park since 1960, averaging less than one sighting per year between 1960 and 1995. Although sightings have increased within nearby Badlands National Park to an average of two or three per year since 1995, most of the sightings throughout the park appear to be young transient males that are probably emigrating from the expanding Black Hills population. Mountain lions have extremely large home ranges (territories can be greater than 500 square kilometers depending on the

mountain lion's age, sex, and season of the year), and there is a large land base in the region for them to use, if disturbed. Consequently, impacts due to the actions proposed at the Minuteman Missile NHS likely would be negligible to this species.

Further, according to a 2007 National Park Service survey at the site, only one special status species (or habitat) was observed at the site. For that survey, a den of swift foxes (a state-listed threatened species in South Dakota) was observed along the embankment of the sewage lagoon at Delta-01. The den of swift foxes has since vacated this site.

Swift Fox Affect Determination

The swift fox resides primarily in deserts and short-grass prairies and form their dens in sandy soil on open prairies, in plowed fields, or along fences. The species is native to the Great Plains region of North America, and its range extends north to the central part of Alberta, Canada, and south to Texas. It reaches from western Iowa to Colorado, Kansas, Wyoming, and Montana. The swift fox nearly became extinct in the 1930s because of eradication programs aimed at eliminating foxes, wolves, and coyotes from the region. Populations have returned but are not yet fully thriving since they only inhabit less than forty-percent of their historic range.

None of the treatment alternatives are proposing modifications to the sewage lagoon embankment at Delta-01. Therefore, none of the treatment alternatives will impact the known den for this species. Further, although the disturbance envelopes vary between the various treatment alternatives, the loss of potential habitat is minimal compared with the adaptability of the species and the large area of available habitat in the region. Therefore, given these considerations, all of the proposed treatment alternatives will have no effect/no adverse effect on this species. This conclusion is reached when the proposed action and its interrelated and interdependent actions will not directly or indirectly affect listed species or destroy/adversely modify designated critical habitat. Because the species is state-listed, Section 7 consultation with the U.S. Fish and Wildlife Service is not required. The no-action alternative and the various treatment alternatives are not anticipated to contribute to cumulative adverse impacts to swift fox or its habitat because direct impacts to this species' known habitat are not proposed. Any direct impact loss to potential swift fox habitat would be offset by the availability of habitat in the region.

Based on the file records research, on-site species surveys, and affect determination on the swift fox, further analysis of federally-listed and state listed species has been dismissed from this document.

Wildlife

The existing landscape exhibits species typical of wildlife adapted to mixed grass prairies. Several large game species are known to occur in the badlands area of South Dakota, outside the property boundaries of Minuteman Missile National Historic Site. These include pronghorn antelope, mule deer, and white-tailed deer. Deer and pronghorn

travel throughout the lands adjacent to the NHS and are seasonally hunted. Other common mammals in the region include coyote, bobcat, least chipmunk, eastern cottontail rabbit, and muskrat. According to the 2007 National Park Service species survey at the site, the species present include deer mice, thirteen-lined ground squirrel, 29 bird species (including killdeer, mourning dove, horned lark, western meadowlark, brown headed cowbird, and lark bunting), and three reptiles/amphibians. The reptiles/amphibians included the Great Plains toad, painted turtle, and gopher snake.

Minuteman Missile NHS has been previously affected through decades of disturbance associated with military operations of the Minuteman Missile program and any wildlife in the area have unquestionably been long habituated to human activity, noise, or departed entirely. Larger wildlife would probably avoid the project area to a certain extent during excavation activities. Overall, populations of affected species might be slightly and temporarily lowered during implementation of any alternative, but no permanent negative effects on wildlife would be anticipated, and wildlife usage in the area would return to pre-project conditions and adverse impacts would not be measurable. Therefore, special status species and wildlife were dismissed as impact topics in this document.

Recommendations for Further Investigation

Recommendations for Future Investigation

1. Testing for lead based paints.
2. Paint analysis to expose the painted quotes in the Capsule vestibule.
3. Paint analysis to determine how many episodes there are on the blast door.
4. Paint color analysis in the Capsule and vestibule.
5. Identification of the equipment removed from the Capsule.
6. Oral confirmation of what the Coke machine looked like in the Dining Room.

Chapter 2: History Summary

Chapter 2: History Summary

Introduction

The Minuteman Missile Launch Control Facility (Delta-01) and Launch Facility (Delta-09) are the only remaining intact examples of the original Minuteman Missile configuration. The Minuteman Missile program was developed as part of the massive retaliation deterrent strategy that characterized American nuclear policy during the early Cold War period. After the entire Minuteman II force was deactivated following the START treaty of 1991, Delta-01 and Delta-09 were preserved as a static display to interpret the history of the Minuteman Missile program and the history of the Cold War.

Preconstruction[1]

The Minuteman Missile program had its origins in the beginning of the Cold War between the United States and the Soviet Union following the end of World War II. Following its overthrow of the Russian monarchy during World War I, the Communist government of the Soviet Union was considered a threat by the United States. The tenuous alliance between the two countries during World War II had been only a temporary measure in the face of the mutual threat of the Nazis. When the Soviet Union began making satellite states of its Eastern European neighbors after the close of the war, the United States saw this as aggressive expansionism designed to eventually overthrow western capitalism.

In the late 1940s and early 1950s, the United States embarked on an effort to contain and neutralize the Soviet threat. At first, it was able to exploit its position as the sole possessor of the atomic bomb. After the Soviets broke the American nuclear monopoly by developing an atomic bomb of their own in 1949, the "arms race" was born: escalating efforts to build bigger bombs with longer ranges in order to stay ahead of the enemy. By the mid 1950s, both sides were developing Intercontinental Ballistic Missiles (ICBMs), designed to deliver a thermonuclear bomb to the other country. In America, the top secret program literally created an entire new industry from the ground up to support its development.

The first generation of long-range missiles developed by the program was the Atlas rocket – essentially a highly evolved version of the German V-2 liquid-fuel propelled missile that had been used against the allies in World War II. Engineers reduced its

[1] Unless otherwise noted, the information in this chapter is condensed from Slattery, Schill and Squiteri, "Minuteman ICBM Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base" (National Register of Historic Places Nomination) and Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study).

weight through an innovative, ultra-light airframe, greatly increasing the missile's range. Concerns about the durability of this design, however, meant that while the developers went ahead with the Atlas program, they also went to work on a backup missile, the Titan. The Titan also used liquid propellants, but its advanced two-stage design would allow the missile to utilize a conventional - and more reliable - airframe.

The Soviet launch of Sputnik in October 1957, utilizing a liquid-fueled ICBM, shook the United States. The Soviets boasted they were turning out missiles "like sausages" and the US military feared it was falling behind in the arms race. One factor limiting the use of liquid-fueled ICBMs was their complexity. In addition to requiring frequent maintenance, the liquid fuel was volatile and had to be loaded immediately before launching, a process that could take hours, and made it necessary to keep a highly trained crew ready at all times. The solution was to create the second generation of ICBMs, simplified missiles utilizing solid-fuel rocket engines that could essentially sit and wait for someone to turn a key. The solid-fuel research program, which had been a relatively low priority in the early years of missile development, became the basis of a new missile program. The goal was a three-stage, solid-fuel missile that could be stored in underground silos and be deployed nearly instantaneously. Authorized in February 1958, the new missile program would be named the "Minute Man," serving as a symbolic reminder of the Revolutionary War soldiers, as well as reflecting the quick response time designed into the missile system.

Led by the Seattle-based Boeing Airplane Company, the team to produce the new missile system was in place by late 1958 and early 1959. By early 1961, the first complete Minuteman was undergoing flight testing.

The compact new missile was only six feet in diameter and 53 feet high -- about half the size of a Titan. Its three cylindrical, steel-cased propulsion stages were stacked one atop the other, with each stage slightly smaller in diameter than the one beneath it. Each stage was filled with a rubbery mixture of fuel and oxidizer, molded around a hollow, star-shaped core. The star-shaped core allowed for the propellant to have an initial large burning surface and therefore, an increased thrust, and to decrease as the points burned away. The Minuteman's inertial guidance system, designed to deliver a single warhead to a preprogrammed target, occupied a small compartment above the third stage. The "reentry vehicle" at the tip was identical to the nose cone that would eventually contain the missile's thermonuclear warhead.

With the success of the rocket itself assured, the focus turned to constructing facilities to house the envisioned arsenal of missiles. The missile program would be under the control of the Air Force, which described the ideal missile locations as sited inside fixed, underground facilities hardened to withstand blast pressures, and stored in the launch position ready for a quick launch reaction. The launch site would require minimal support, and the launch units were to be self-supporting for two weeks. The Air Force had been refining this system throughout the Atlas and Titan programs, and would finally achieve its goal in the Minuteman Missile program.

Air Force planners organized the nation's Minuteman force into a series of administrative units called "wings," each with three or four 50-missile "squadrons." Each squadron was further subdivided into five smaller units, called "flights." A flight consisted of a single, manned, underground launch control center, linked to ten unmanned, underground launch facilities (silos). The silos were physically separated from the control center and from each other by a distance of several miles. The Air Force initially considered deploying the Minuteman as far south as Georgia, Texas, and Oklahoma, but when it became apparent that the early models of the missile would fall short of their intended 5,500-mile range, planners quickly determined that they could solve the problem by selecting sites "in the northern part of the United States relatively close to the Soviet Union."

The first Minuteman deployment area was near Malmstrom Air Force Base near Great Falls, Montana. Locating the missile facilities near an Air Force base would provide crucial logistical support, and the remoteness of the location minimized the chance of civilian casualties in the event of an accident or attack. Other reasons for locating the facilities there included an established network of improved roads, and an abundance of easily acquired land. Shortly before construction began at Malmstrom, in January 1961, Ellsworth Air Force Base was selected as headquarters for the second wing of Minuteman Missile deployments.

Ellsworth had all the advantages that Malmstrom AFB had offered. The base had been established in 1941 as the Rapid City Army Air Field to train B-17 bomber crews. After the Strategic Air Command was established in 1946, the Air Force became a separate branch of the military in 1947, and Ellsworth Air Force Base became a Strategic Air Command base. In 1960, Titan I ICBM facilities were built as part of the Ellsworth AFB command.

The announcement that a wing of Minuteman Missiles would be built on the plains of South Dakota east of Rapid City created both concern and anticipation among local residents. Landowners, concerned that national security would become an excuse to pay below market value prices, formed the Missile Area Landowner's Association to negotiate fair land prices. At the same time, the South Dakota State Highway Department spent $650,000 from the Federal Bureau of Public Roads to improve 327 miles of gravel roads leading to the prospective missile sites. By mid-June 1961, Boeing was also busy with infrastructure improvements. Anticipating that the project would bring more than 3,000 workers into the area, the company raced to erect mobile-home camps and cafeterias near Wall, Sturgis, Belle Fourche, and Union Center, as well as in Rapid City.

By early summer, more than three-quarters of all area landowners had agreed to give the government access to their land. Once the sites had been finalized, the Ralph M. Parsons Company, an architectural/engineering firm from Los Angeles, began to prepare detailed plans for the South Dakota installations. The Air Force had assigned responsibility for actual construction of Minuteman facilities nationwide to the U.S. Army Corps of Engineers Ballistic Missile Construction Office. In mid-June, the Corps sent out a request

for construction bids, and within a month, four of the nation's largest contracting firms had submitted proposals for the project. The low bid came from Peter Kiewit Sons' Company of Omaha, whose estimate of $56,220,274 was nearly $10 million below government projections. On August 1, the Corps gave Kiewit a fixed-price contract for "digging and pouring 150 underground silos 12 feet in diameter and 80 feet deep, plus fifteen control centers." The construction sites would be distributed across an area of nearly 13,500 square miles located to the east, north, and northwest of Rapid City. Kiewit set to work immediately, hiring construction crews and moving heavy equipment onto the job sites.

The official groundbreaking ceremony for Ellsworth's Minuteman complex took place at Site Lima-06 near Bear Butte on September 11, 1961. Despite extreme cold, high winds and heavy snowfall, construction activity proceeded at a furious pace through the winter of 1961-62. At a press briefing in mid-December, a Corps of Engineers spokesman told reporters that "men are working seven days a week, three shifts a day on Minuteman construction...Crews…are able to dig five silo emplacements simultaneously. Each takes from four to ten days [depending on soil conditions]." Work on the first squadron, near Wall, was "well underway," he said, and work on the second squadron, near Union Center, had already been started.

The Rapid City Daily Journal explained how a hardened silo was built (figure 2-1):

> *Conventional earthmoving equipment scoops an open cut 12 feet deep. A backhoe perches on the edge of a large hole in this cut and digs a hole 20 feet deeper. The remaining 52 feet of depth is 'mined' by a clamshell.... When each hole is at the full depth of 84 feet, a steel 'can' 12 feet in diameter is carefully positioned in it. Reinforced concrete is poured between the can and earth.*



Figure 2- 1: Delta-09 Launch facility under construction, ca. 1962
(source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-39).

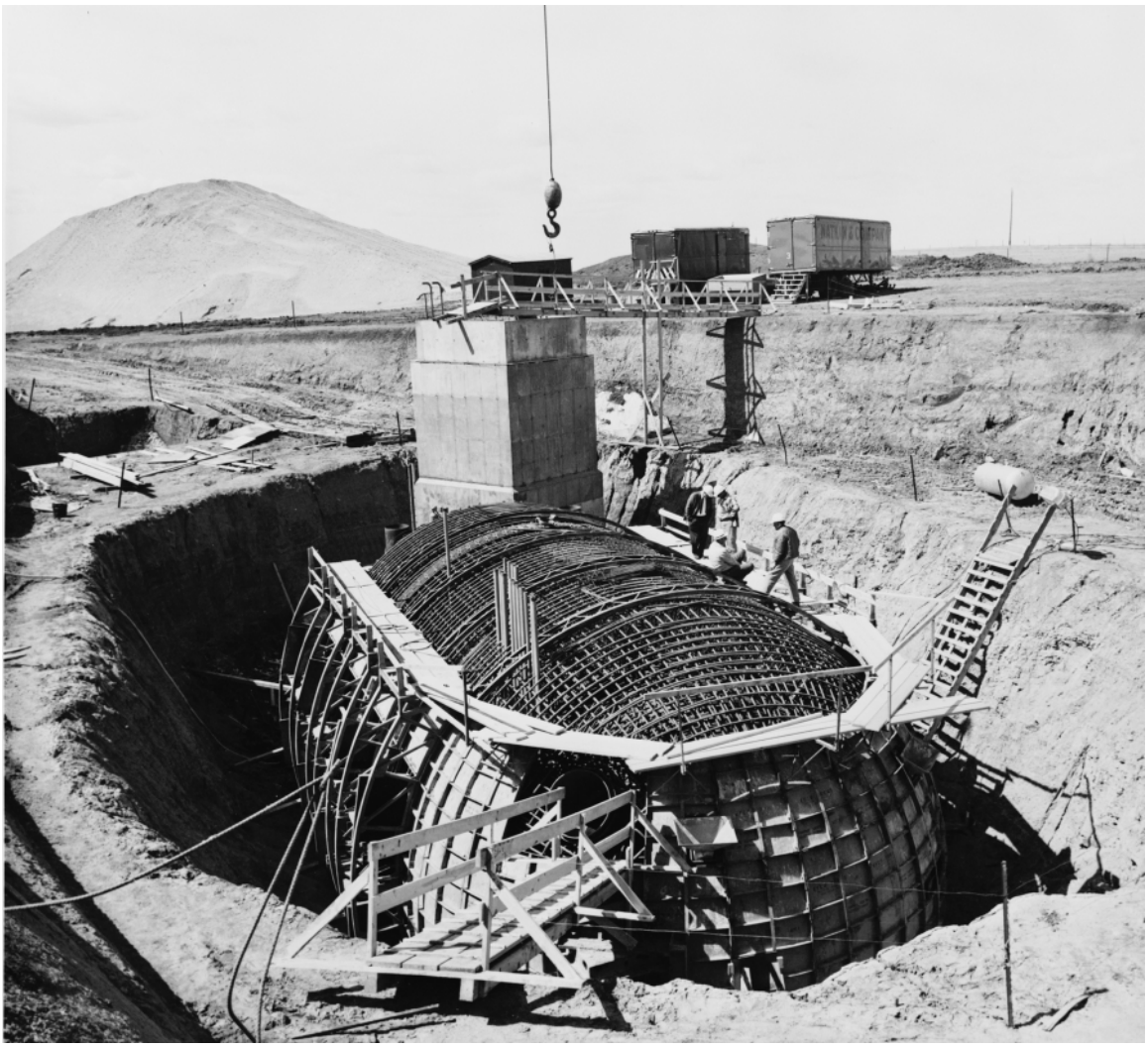


Figure 2- 2: Delta-01 Launch Control Capsule under construction, ca. 1962
(source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-24)

As construction continued at the Ellsworth AFB sites, Air Force crews at Malmstrom AFB began to lower the weapons into their silos at the end of July 1962. The first ten-missile Minuteman flight was activated on 27 October 1962, at the height of the Cuban Missile Crisis.

Construction continued at Ellsworth into the summer of 1963. To provide personnel and support for the Minuteman Missile facilities at Ellsworth AFB, the Air Force redesignated the 44th Bombardment Wing at Lake Charles AFB, Louisiana, as the 44th Strategic Missile Wing (SMW) and moved it to Ellsworth AFB. Initially in control of maintenance and operations for the Titan missiles at Ellsworth AFB, the 44th SMW eventually took control of the Minuteman Missile flights as they came online.

The launch facility at Delta-09 was completed on November 26, 1962, and the Delta-01 Launch Control Facility was completed three days later (see figures 2-2 to 2-4 and Period of Change Plan "Pre-1963" at the end of this chapter).[2] The cost to construct Delta-01 was $800,000, and Delta-09 was $354,500. By the following summer, steel fabrication was finished at all 165 sites, and crews were completing the launchers at the rate of one per day. In April 1963, Boeing began emplacing the first missiles in the Ellsworth AFB silos. On the last day of June, Ellsworth's first twenty launchers, included Delta-01 and Delta-09 were turned over to the Strategic Air Command. On 23 October, the nation's second wing of Minuteman ICBMs was declared fully operational. The work had been completed nearly three weeks ahead of schedule.



Figure 2- 3: Oblique aerial view of Delta-01 Launch Control Facility under construction, facing southeast, circa 1962
(source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-32).

[2] See Delta-01 and Delta-09 Pre-1963 period plans at the end of this chapter.



Figure 2- 4: Aerial oblique view of Delta-01 launch control facility under construction, parking area and approach road completed, sewage lagoon at lower right, ca. 1962
(source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-33).

Episode 1: Minuteman I (1963-1971)

Reflecting the fact that the Minuteman Missile program was in the forefront of missile technology, the history of the Delta-01 and Delta-09 facilities is one of continuous improvement and refinement. In the first few years after its construction, the Air Force concentrated on improving the site and adding necessary equipment. At the Launch Control Facility (Delta-01), an area from the perimeter fence to twenty feet outside and five feet inside the fence was denuded of vegetation and stabilized with an asphalt emulsion soil stabilization material, in order to provide clear security around the perimeter of the site. All other soil areas, including the area around the radial antenna, were sown with perennial rye grass.[3] Later in 1963, a security surveillance antenna system was added at Delta-01.[4] During that first year, the first sewage pond at Delta-01 was also constructed.[5] There are indications that water infiltration was a concern at the

[3] MCL 1789, July 1963.
[4] Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions.
[5] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.

launch facilities; in November 1963 a high water level alarm was installed in the Delta-09 equipment room.[6]

Communications between the launch control facilities and their associated launch facility silos were crucial to the success of the missile program. The original communication system was a series of underground blast-proof cables run between sites, known as the Hardened Intersite Cable System (HICS) (figure 2-5). While this system was used until the Minuteman Missile sites were deactivated in 1993, other communications systems were also added over the years. Separate blast-hardened HF transmit and receive antennas were constructed at Delta-01 in 1963. Both of these consisted of reinforced concrete cylinders with telescoping antenna poles. The receive antenna had four backup antennas in the event that the main pole was damaged. In addition, a survivable low-frequency communication system (SLFCS) antenna was installed in 1968 as part of the facility's EWO (Emergency War Order) communication system, providing further backup in the event of war. In the same year, a hardened UHF antenna was installed at Delta-09.[7]

[6] MCL 1991, November 22, 1963.
[7] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II; Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions.

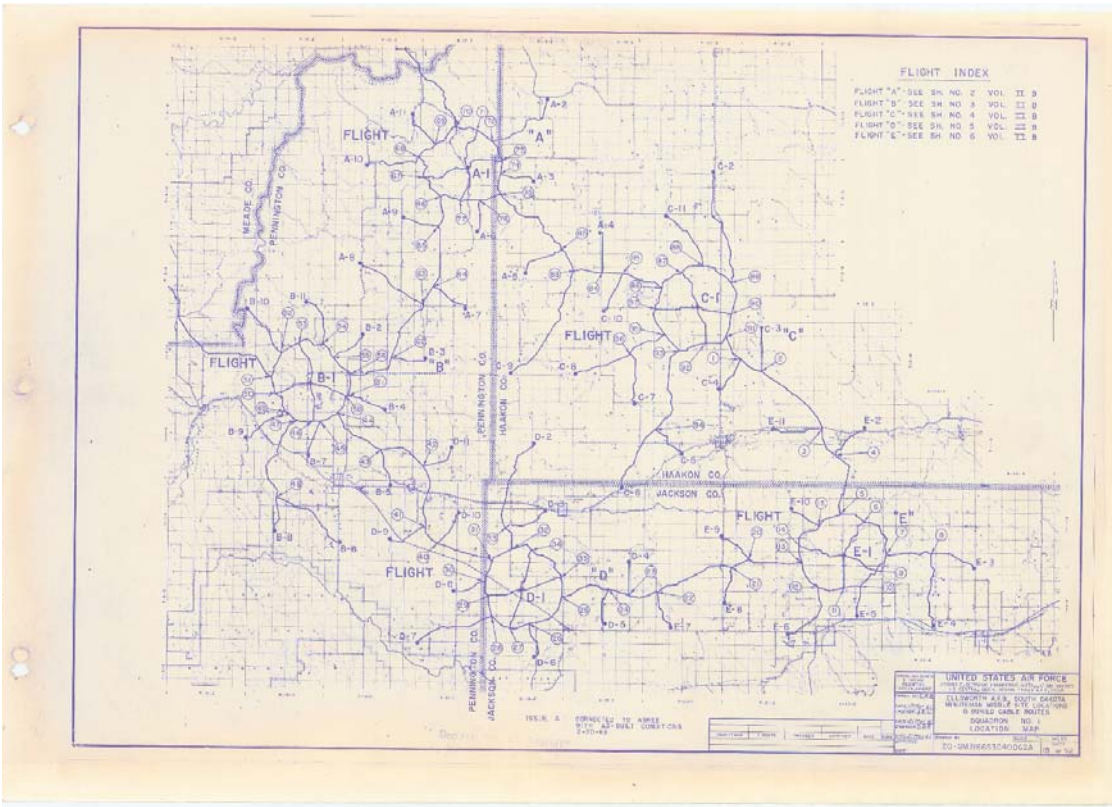


Figure 2- 5: 1961 Map of HICS Cabling, Flights A-E (source: Minuteman Missile archives, Records of the 44th Strategic Missile Wing, Ellsworth Air Force Base, United States Air Force, MIMI 2864).

More significant improvements occurred at Delta-01 in the mid to late 1960s. A separate Vehicle Heated Storage Building was constructed at the northwest corner of the main building around 1968.[8] A helicopter pad was added to the site along the access road in 1966, and later replaced with one at the southwest corner of the site in late 1970 or early 1971.[9] Also in 1970-71, a second sewage lagoon was dug at the southeast corner of the original structure (see Period of Change Plan "1963-1971" at the end of this section).[10]

From 1963 to 1967, Minuteman complexes were added at Minot and Grand Forks Air Bases in North Dakota, Whiteman Air Force Base in Missouri, and F.E. Warren Air

[8] Parsons Company, "Contract documents for Vehicle Heated Storage Building," March 19, 1965. A 1961 D-1 plot and utility plan shows the garage in place as does an operational as-built of the site. Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199),"revisions.
[9] Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions; Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II and Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions.
[10] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II. Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions.

Force Base in Wyoming, as well as an additional squadron at Malmstrom. By 1967, there were 1,000 Minuteman Missiles on alert nationwide.

The original Minuteman installations, such as those at Ellsworth AFB, had been designed for mass attacks, launching all the missiles at once with a very limited survival time built in to the system. In the early days of the Kennedy administration, while the installation at Ellsworth AFB was already designed and under construction, this policy shifted to a more controlled response, allowing missile crews to fire missiles selectively. To meet the requirement of greater survivability, the Air Force decided to install the power generators at Minuteman sites in hardened underground capsules located next to each of the control centers. Although the Air Force investigated the feasibility of incorporating hardened generator capsules into the facilities at Ellsworth AFB, construction had already started there by the time the decision was made, making the change impractical. Consequently, the generator capsules were introduced with the third Minuteman deployment area at Minot Air Force Base, North Dakota. Thus, the only Minuteman sites to reflect fully the nation's original Cold War strategy of massive retaliation were those at Malmstrom and Ellsworth.[11]

Episode 2: Minuteman II (1971-1993)

By the time planning began for the final Minuteman deployment area, the Air Force had developed a vastly improved version of the missile itself. The new missile, called the Minuteman II, offered improved range, greater payload, more flexible targeting, and greater accuracy, leading one Air Force spokesperson to estimate that its "kill capacity" was "eight times that of Minuteman I." In early 1964, Secretary of Defense Robert McNamara told the House Armed Services Committee that the Defense Department was planning to upgrade the first five deployment areas by replacing their Minuteman I missiles with the more advanced Minuteman IIs. The project was approved in the spring of 1965, and the first of the new missiles were deployed at Grand Forks Air Force Base, North Dakota, in 1966. In the fall of that year, South Dakota Congressman E.Y. Berry announced that the retrofit program would also be employed at Ellsworth. According to Berry, the new missiles would help Ellsworth maintain its position as "one of the nation's most important military installations." The new missiles arrived in South Dakota in October 1971, when Boeing began to refit the Ellsworth silos to accommodate the Minuteman II system. By March 1973, the modifications for Minuteman II were completed at Delta-01 and Delta-09.[12]

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[11] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.

[12] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II. A third version, the Minuteman III, was deployed at F.E. Warren, Minot, Grand Forks, and Malmstrom AFBs by 1975, constituting over half the ICBM force in the US. The remaining sites at Malmstrom, Ellsworth, and Whiteman AFBs

The modifications to the missile silos for the Minuteman II force was accompanied by a number of minor alterations in 1971 to the living quarters in the Launch Control Facility at Delta-01. These alterations included new soundproof partitions and a single interior solid core wood door in the corridor between bedroom 116 and toilet room 115 and window air conditioning units in bedrooms 116, 118, 120, and 124; and replacement of the base cabinets in the kitchen, and new stainless steel covers for the sink units in the south counter.[13] In addition it appears that the facilities all underwent a completely new interior paint campaign, consisting chiefly of shades of green, grey, and white.[14]

Other alterations to the living quarters in the 1970s included the replacement of the exterior doors with hollow metal doors with metal thresholds (1976),[15] the replacement of the kitchen base cabinets with a sink base and three drawer unit, with black rubber cove base installed in the toe space (1976),[16] replacement of all the windows with wood insulated windows (1976),[17] and the replacement of the fascia and soffits with in-kind wood (1979).[18] In 1974, the existing shoring device in the launch control center was replaced with a permanent floor shoring device, and in 1978, the cot in the center was replaced with a curtain system and bunk.[19]

There were also numerous alterations to the sites of Delta-01 and Delta-09 during the 1970s. Vegetation control was an ongoing effort at both sites, with a new three-year campaign proposed in 1975.[20] At Delta-01, the HF transmit antenna was deactivated in the 1970s, probably replaced with the hardened UHF antenna that was installed there in

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retained the Minuteman II missiles (National Register of Historic Places nomination, section 8, page 21).

[13] Strategic Air Command, "Missile Alert Environment,"ELS-M-2-70, April 9, 1971; Strategic Air Command, "Replace LCF Kitchen Cabinets," ELS-M-13-76, April 13, 1976.

[14] 44th Strategic Missile Wing Paint Plan, March 1, 1973. A preliminary paint analysis was initiated in selective rooms of the Launch Control Support Building to determine a general palette of colors used over time; see laboratory data sheets in Appendix A. Two episodes will be selected to do additional laboratory color matching to the Munsell color system during the next phase of Part 2.

[15] Strategic Air Command, "Replace LCF Doors,"ELS-M-11-76, March 17, 1976.

[16] Strategic Air Command, "Replace LCF Kitchen Cabinets," ELS-M-13-76, April 13, 1976.

[17]Strategic Air Command, "Replace LCF Windows," ELS-M-12-76, April 7, 1976. Subsequent drawings indicate the windows are Anderson Perma-Shield Narrowline vinyl-clad double hung windows with combination storms/screens by Anderson.

[18]Strategic Air Command, "Launch Control Facility Replace and Paint Fascia and Soffit 10 LCFs," ELS-M-1-79, August 7, 1979. The exception was the detached garage where existing trim was painted. Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.

[19] MCL 6066, November 29, 1974; MCL 6152, January 19, 1978.

[20]"Proposal to Apply Vegetation Control to 150 Missile Sites," October 22, 1975. Treatments were applied the first year in March-April, and in the late fall in the 2nd and 3rd years; the accompanying drawing showed the graveled areas to be spot sterilized at typical LFs, dated Dec 17 1975.An 18" band of sterilant was centered on the fence line of the LCFs.

1976.[21] In January 1976, the gates at Delta-01 were repaired.[22] The Air Force registered a complaint in 1977 from the neighbor "immediately west" of Delta-01 that concrete rubble from the construction of the site had been discarded on their land and buried so shallowly that 5 to 6 ton pieces had been exposed. Maintenance removed the pieces and filled the holes.[23]

At both Delta-01 and Delta-09, signs were installed at the nearby highway exits identifying the site locations in 1976.[24] At Delta-09, lanyard attachment points were installed on the Launch Facility walls and between the T.E. pylons.[25] In the same year, the unused sight control tubes from the personnel access hatch to the silo were permanently closed. These were originally designed to allow guidance technicians to establish visual references to a pair of azimuth makers located on the surface, but were apparently not being used. They were welded shut top and bottom and filled with sand. [26]

Improvements to Delta-01 and Delta-09 continued into the 1980s. Women were assigned to topside duty for the first time in the 1980s, and a women's latrine was added to accommodate them in the living quarters at the Launch Control Facility in 1985.[27] By the following year (1986), women were allowed on crews in the launch control centers, but only as part of all-female crews.[28]

Exterior work to the topside quarters at Delta-01 in 1983-84 included replacement of the exterior asbestos siding with new ½" CDX Plycore sheathing where the existing sheathing was damaged, preformed polystyrene insulation board, steel siding and trim, and aluminum soffit and fascia, painting the remaining exposed wood surfaces, replacing all the windows with new wood windows, adding new exterior metal doors to the garage/rec room, and the addition of hoods to the louvers on the north elevation.[29] At the interior, the kitchen and baths were improved with new upper kitchen cabinets, replacement of the shower enclosures, toilet partitions, counters and lavatories as well as

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[21] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[22] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[23] "Real Property Maintenance Request," August 24, 1977.
[24] "Missile Site Indicator Signs," December, 1976; Sign installed at exit 116 of I-90 for D-9; Signs installed at exit 127 of I-90 for D-1.
[25] MCL 6158, June 17, 1976.
[26] MCL 6165, July 29, 1976; Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[27] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II; Contract Documents for new women's latrine, December 20, 1985.
[28] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[29] Strategic Air Command, "Launch Control Facility Upgrade," ELS-B-684, August 5, 1981; Strategic Air Command, "Replace Siding 15 Launch Control Facilities," ELS-B-735; Strategic Air Command, "Install New Brine Chiller Hoods at LCFs," ML-MH-005, January 15, 1982.

new tile flooring, new paper towel dispensers, and a new waste unit. Carpets were replaced, bedroom walls at the corridor, toilet room, and kitchen received acoustic panels, and new suspended acoustic ceilings and fluorescent lighting with emergency lighting was installed in the bedrooms, hallways, dining room, dayroom, vestibule, and security office.[30] Un-faced batt insulation was installed in the attic, and all domestic lines were relocated to the interstitial space between the old ceiling and the new suspended ceiling. The attached garage was enclosed to create a recreation room; the walls were insulated and finished with painted drywall and wood wainscot, except on the east wall, where plywood paneling was reinstalled. [31]



Figure 2- 6: Delta-01 looking northwest, ca. 1982
(source: Minuteman Missile archives, Wilderman Collection, MIMI 2363).

Historic photographs from the early 1980s suggest that the greens and greys of the 1974 paint campaign had been replaced by varying shades of blue in the vestibule of the launch control center. The upper half of the LCC vestibule walls were painted white, while the lower half was a dark blue. These photos also are the first evidence of the decorative paintings done by various members of the missileer crew, which became a tradition at the launch control facilities (figure 2-7 to 2-9). At Delta-01 in the 1980s, these included a painting of the Strategic Air Command shield on the south wall of the vestibule. At the

[30] Strategic Air Command, "Launch Control Facility Upgrade," ELS-B-684, August 5, 1981; and Strategic Air Command, "Replace Siding 15 Launch Control Facilities," ELS-B-735.
[31] Strategic Air Command, "Replace Siding 15 Launch Control Facilities," ELS-B-735.

blast door, the exterior was painted with a representation of a monkey smoking a cigar and holding a Minuteman Missile in its right hand, as well as the words "Welcome – Delta Launch Control Center." The side of the blast door was painted blue with white stars, and the wide jamb of the door had a silhouette of a Minute Man soldier. On the wall above the blast door, "Peace is our Profession" was stenciled above the door, and to the right of the blast door was a sign noting that "No Lone Zone – Two Man Policy Applies". On the southwest wall of the vestibule adjacent to the elevator, several "leadership" quotes by generals were painted within red, white and blue bordered boxes.

Interior photos appear to show the equipment and other surfaces within the launch control center as also painted blue; however, we believe that this is a problem with the colors of the image (perhaps discoloration of the slides), as later photographs from circa 1990 show the equipment as green, as it is currently (figure 2-10).



Figure 2- 7: LCC Vestibule ca. 1982
(source: Minuteman Missile archives, Wilderman Collection, MIMI 2363).

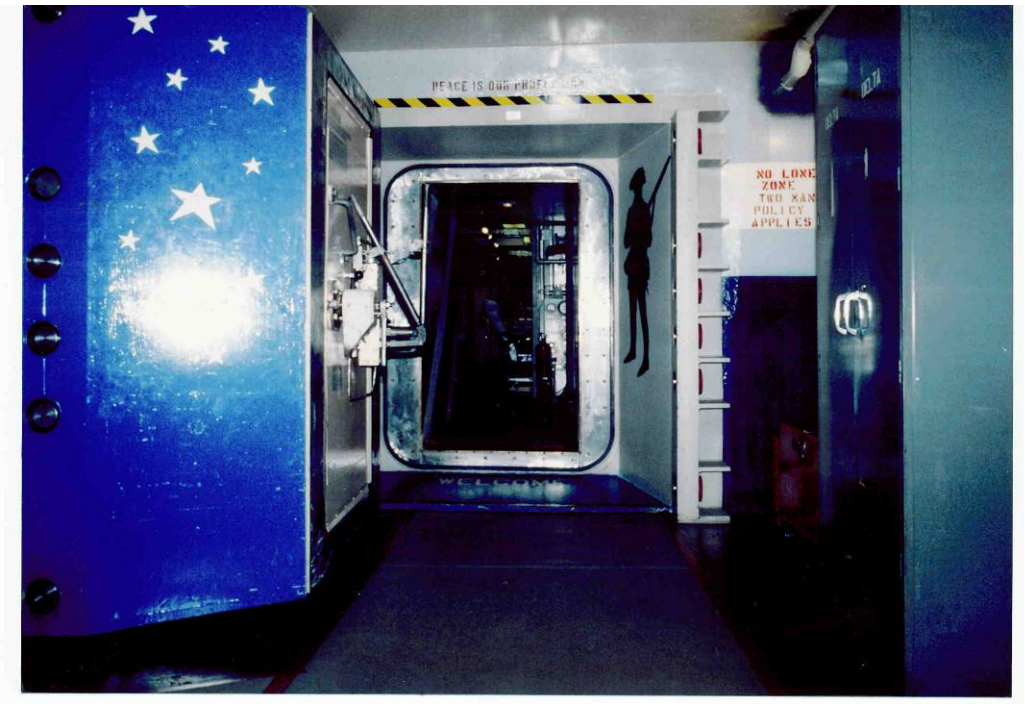


Figure 2- 8: LCC blast door and tunnel circa 1982
(source: Minuteman Missile archives, Wilderman Collection, MIMI 2363).



Figure 2- 9: LCC Vestibule ca. 1982
(source: Minuteman Missile archives, Wilderman Collection, MIMI 2363).



Figure 2- 10: Launch Control capsule ca. 1982
(source: Minuteman Missile archives, Wilderman Collection, MIMI 2363).

The launch control centers were hardened to withstand a nuclear blast, so even the most trivial equipment had to be specially ordered and installed, such as the replacement of the refrigerator and toaster oven units in 1984, the upgrade of the latrines in 1988, the installation of microwave ovens and coffeemakers in 1989, and the addition of a modular bed storage unit assembly in 1990.[32]

Another round of improvements to the topside living quarters in 1985 included new counters in the security office, the aforementioned women's latrine, new east and south walls to create the serving room (114), new sewer connections, new fan coil units in the

[32] MCL 6611, June 15, 1989 (Microwave oven and coffeemaker installation); MCL 6654, October 1, 1990 (Modular Bed Storage Unit Assembly and Instructions).

bedrooms, serving room, living room, garage/rec room, and security office along with a new chiller and condensing unit, and the addition of a vision window in the corridor door.[33] In 1986, an enclosed storage room was constructed in the heated vehicle storage building.[34]

With so many metallic surfaces at both Delta-01 and Delta-09, corrosion was a constant issue. In 1981, a new cathodic protection system was designed for the Minuteman Missile sites. Cathodic protection systems, including the rectifiers (which provided the DC power) were completed at Delta-01 and Delta-09 by the end of 1982.[35]

In 1985, the Air Force inaugurated the Rivet MILE (Minuteman Integrated Life Extension) program. While the Minuteman force had been in place for over 20 years, the Rivet MILE program was designed to expand the life of the system into the 21st century. The most significant improvement as a result of Rivet MILE was the installation of the IMPSS (Improved Minuteman Physical Security System). It replaced troublesome older security systems so sensitive that they could be set off by "elk, rabbits, even high-jumping grasshoppers." The IMPSS antennas were installed on the sites by the end of 1989.[36]

Other improvements in the late 1980s included the installation of a cover with pipe extension on the Launch Facility (Delta-09) support building air intake to prevent snow from entering the shaft in March 1985,[37] the addition of a flagpole at Delta-01 in January 1986,[38] and the regrading of the site at Delta-09. In 1987-88, the hardened HF receive antenna at Delta-01 was deactivated, and a television satellite dish was installed (figures 2-11 and 2-12).[39]

[33] Strategic Air Command, "Alter 15 LCFs," 84-6003B, December 20, 1985.
[34] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[35] MCL 6355, April 1982 (Cathodic Protection for 49 LFs); MCL 6315, March 1981 (Install Cathodic Protection for 14 LCFs)
[36] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II; Ellsworth 88-6004, IMPSS prep at Delta 09, Parsons-Staven, "Launch Facility Site D-9 (276) Grading Plan, 129/103, " revisions, June 5, 1961.
[37] MCL, March 11, 1985.
[38] Parsons-Staven, "Plot and Utility Plan, Launch Control Facility Site D-1 (199)," revisions.
[39] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.



Figure 2- 11: Aerial view of Delta-01 from the northeast, ca. 1990
(source: Minuteman Missile Digital Collection, Loughney Collection).



Figure 2- 12: Launch control support building from the south, ca. 1990
(source: Minuteman Missile Digital Collection, Loughney Collection).

A set of photographs from 1990 show changes that had taken place in the launch control center and vestibule after 1982 (figures 2-13 to 2-14). The equipment and surfaces in the capsule itself are painted in shades of green. The vestibule still had the upper half white and lower half blue, although the shades appeared somewhat lighter than before. The painting on the side of the blast door and the jamb were painted over with grey paint and the stenciling over the door was painted over as well. The warning to the side of the blast door now reads "No-Lone Zone: Two-man Concept Mandatory." The painting on the exterior of the blast door was now a depiction of Wile E. Coyote and the Roadrunner and the saying "Go Ahead – Make My Day." Sometime after 1990 and before the site was decommissioned, the blast door was painted with a depiction of a Domino's pizza box showing a Minuteman Missile and the word Minuteman II. Above and below the box are the words "World-Wide Delivery in 30 Minutes or Less or Your Next One is Free." This painting is still present. On the northeast wall adjacent to the elevator cage was a depiction of a Minuteman Missile blasting through the remnants of a Soviet flag (this painting is still present). On the interior of the capsule above the blast door was painted a skull and crossbones with the phrase "Kick Ass" below. Also on the interior of the capsule to the right side of the blast door was painted the emblem of the 44th Missile Wing. The latter two images had been painted over by 1990.

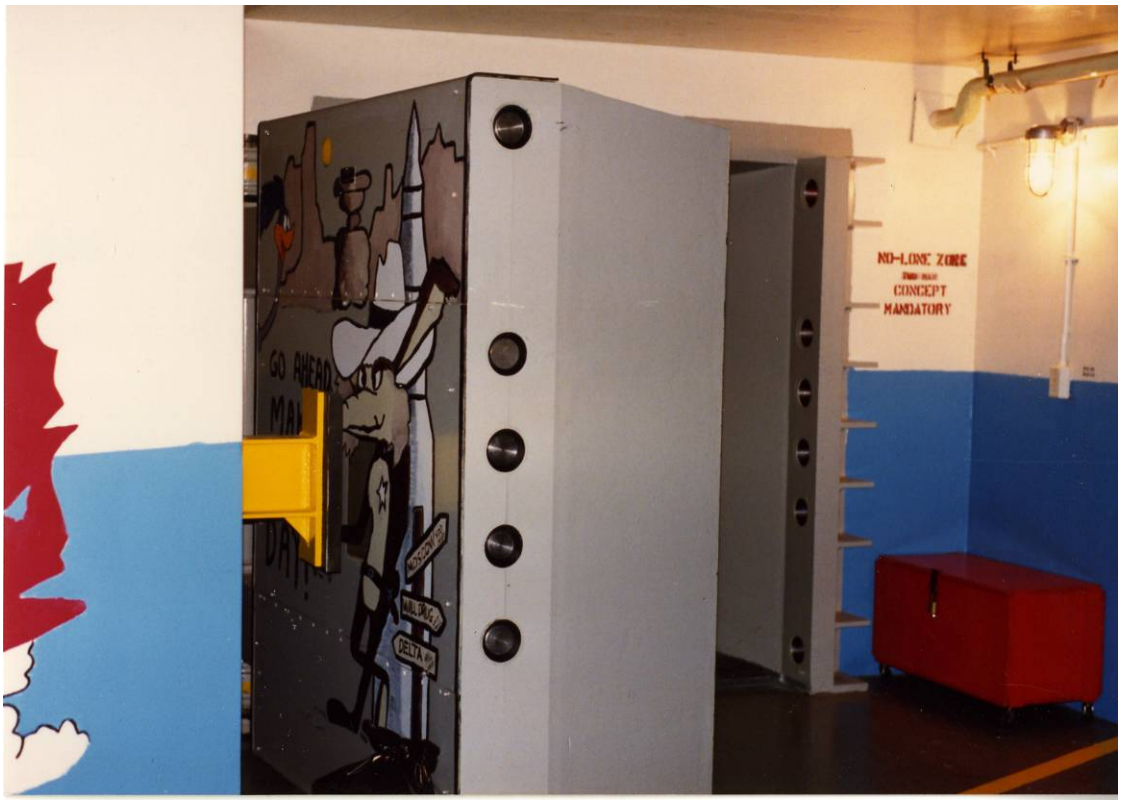


Figure 2- 13: LCC Vestibule ca. 1990 (source: Minuteman Missile Digital Collection, Loughney Collection).



Figure 2- 14: Launch control capsule, ca. 1990 (source: Minuteman Missile Digital Collection, Loughney Collection).

The last significant improvement to the Minuteman complexes at Ellsworth AFB was the installation of a super high frequency satellite terminal and antenna in 1990-1992 (see Period of Change Plan "1971-1993" at the end of this section).[40]

Episode 3: Deactivation and National Historic Site (1993- Present)

During the late 1980s, the world saw unmistakable signs that the lengthy Cold War period was coming to an end. By the end of the decade, the Berlin Wall had been dismantled, Germany had been reunified, and a number of former Eastern Bloc nations had replaced their Communist regimes with democratically elected governments. As the new decade began, the Soviet Union disintegrated rapidly as its constituent republics declared their independence one by one. When the Warsaw Pact was dissolved in March 1991, the enemy that President Ronald Reagan had once called "the evil empire" essentially ceased to exist. Four months later, on July 31, 1991, President George H.W. Bush and Soviet Leader Mikhail Gorbachev signed the *Treaty Between the United States of America and the Union of the Soviet Socialist Republics on the Reduction and*

[40] MCL 6653, February 1, 1990 (RPIE Interface – ICBM Super High Frequency Satellite Terminal (ISST) Installation).

Limitation of Strategic Offensive Arms (START Treaty), which placed a limit on the number of ICBMs and prescribed a process for the destruction of their launch facilities.[41]

The START Treaty coincided with growing Air Force disenchantment with escalating costs associated with repairing and maintaining the older Minuteman II system. Rather than upgrade Minuteman II facilities with Minuteman III, the Pentagon decided to deactivate the entire Minuteman II force to help comply with provisions of the arms-reduction treaty. On September 27, 1991, Bush appeared on national television to announce a dramatic "plan for peace," designed to reduce the tensions of the nuclear age. As one component of his plan, he called for "the withdrawal from alert within 72 hours, of all 450 Minuteman II intercontinental ballistic missiles," including the missiles at Ellsworth Air Force Base.[42]

Five weeks later, on December 3, 1991, an Air Force crew arrived at Launch Facility Golf-02, located near Red Owl, about 60 miles northeast of Rapid City. They had come to remove the first of Ellsworth's 150 Minuteman IIs:

> Disarmament began with snow shovels at dawn…as Airman 1st Class James Comfert and his colleagues cleared the launch-door rail…Six hours later, a Minuteman II intercontinental ballistic missile was stored safely in its transporter/erector truck. G-2 was just a high-tech hole in the ground.[43]

According to the *Rapid City Daily Journal*, the Ellsworth deactivation process would continue for at lease three more years:

> First, warheads and guidance systems [will be] removed. Then the missiles will be pulled…The headframes of the missile silos will be destroyed and the tubes will be filled with rubble. The launch control capsules will be buried under rubble and a thick concrete cap. The land and aboveground buildings at launch control centers will be sold.[44]

By late 1996, 149 of the original 150 launch facilities at Ellsworth had been imploded in accordance with terms of the START Treaty. Only one launch complex remained intact, consisting of Minuteman ICBM Launch Control Facility Delta-01 and Launch Facility

[41] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[42] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[43] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[44] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.

Delta-09. These sites were spared with the intention of converting them into interpretive museum facilities open to the general public.[45]

Although Delta-01 and Delta-09 remained intact, the deactivation process required the removal of certain equipment in order to comply with the terms of the START treaty and to protect classified equipment. Beginning in May 1993, removals included classified information, hazardous materials, some military communications equipment, diesel storage tanks, and of course, the missile itself. The remaining communications equipment and alarm systems were disconnected, non-functioning radio control panels were installed, and exposed drawer openings were covered. According to the terms of the treaty, the HICS cable was severed and a one foot section was removed to ensure it could not function. All other equipment and furnishings remained as they had been when the last crew left the facility.[46] Delta-01 and Delta-09 were placed on caretaker status.

Although the United States Congress established the Minuteman Missile National Historic Site on November 29, 1999, the United States Air Force retained ownership and control of the sites until 2002. In 2001, a training model of a Minuteman Missile was installed in the Delta-09 silo, and a glass viewing enclosure was constructed over the silo (see Existing Conditions Site Plan in Chapter 3).

On May 21, 2002, a Russian team visited the sites of Delta-01 and Delta-09 to confirm that the deactivation of the site was complete and done in accordance with the START treaty. The following September, the USAF officially turned over Delta-01 and Delta-09 to the National Park Service. With the installation of security and fire suppression systems at both sites in 2003,[47] the Park Service began offering tours of the facilities to visitors, providing them with a glimpse into life at one of the sites that protected Americans throughout the Cold War.

[45] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[46] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.
[47] Slattery, Ebeling, Pogany, and Squiteri, "The Missile Plains: Frontline of America's Cold War," (Historic Resource Study), Chapter 4, Section II.

Next pages:

Figure 2- 15: Delta-01 Site, Pre-1963 Conditions (source: QEA 2010).
Figure 2- 16: Delta-01 Site, 1963-1971 Conditions (source: QEA 2010).
Figure 2- 17: Delta-01 Site, 1971-1993 Conditions (source: QEA 2010).

Figure 2- 18: Delta-01 Floor Plans, 1963-1971, Episode 1 (source: QEA 2010).
Figure 2- 19: Delta-01 Floor Plans, 1971-1993, Episode 2 (source: QEA 2010).
Figure 2- 20: Delta-01 Floor Plans, 1993-present, Episode 3 (source: QEA 2010).

Figure 2- 21: Delta-01 Elevations, 1963-1971, Episode 1 (source: QEA 2010).
Figure 2- 22: Delta-01 Elevations, 1971-1993, Episode 2 (source: QEA 2010).
Figure 2- 23: Delta-01 Elevations, 1993-present, Episode 3 (source: QEA 2010).

Figure 2- 24: Delta-09 Site, Pre-1963 Conditions (source: QEA 2010).
Figure 2- 25: Delta-09 Site, 1963-1971 Conditions (source: QEA 2010).
Figure 2- 26: Delta-09 Site, 1971-1993 Conditions (source: QEA 2010).

Figure 2- 27: Delta-09 Floor Plans, 1963-1971, Episode 1 (source: QEA 2010).
Figure 2- 28: Delta-09 Floor Plans, 1971-1993, Episode 2 (source: QEA 2010).
Figure 2- 29: Delta-09 Floor Plans, 1993-present, Episode 3 (source: QEA 2010).

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

DELTA-01 PRE-1963 CONDITIONS



0 40 80 160 240 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Launch Control Center
3 Launch Control Facility
6 Hardened UHF Antenna
9 Helicopter Pad
11 Code Burner
12 Basketball Goal
13 Security Fencing
16 Bollards
18 Well & Water Tanks
19 Access Road & Parking Area
22 Gas Pump
24 Diesel Fuel Tank
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Acess Roads

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Asphalt
Concrete

SOURCES

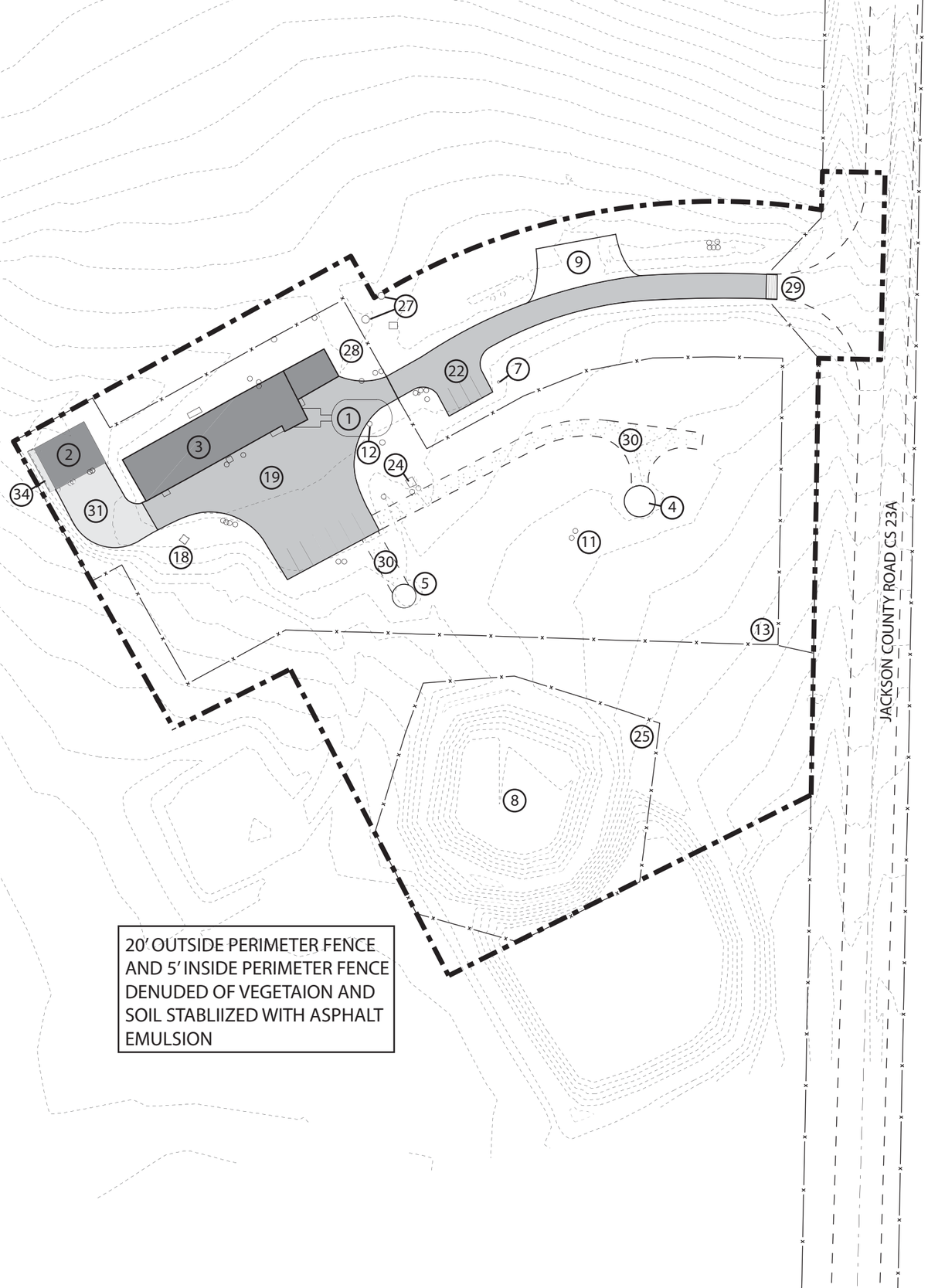
LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

QUINN EVANS
ARCHITECTS

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

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DELTA-01 1963-1971 CONDITIONS



0 40 80 160 240 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Launch Control Center
2 Heated Vehicle Storage Building (late 1960s)
3 Launch Control Facility
4 Hardened HF Transmit Antenna (1963)
5 Hardened HF Receive Antenna (1963)
7 SLFCS Antenna (1968)
8 Sewage Lagoon (1963)
9 Helicopter Pad (1966)
11 Code Burner
12 Basketball Goal
13 Security Fencing
16 Bollards •
18 Well & Water Tanks
19 Access Road & Parking Area
22 Gas Pump
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing (1963)
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Acess Roads
31 Concrete Driveway (late 1960s)
34 Underground Diesel Tank

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
Asphalt
Concrete

SOURCES

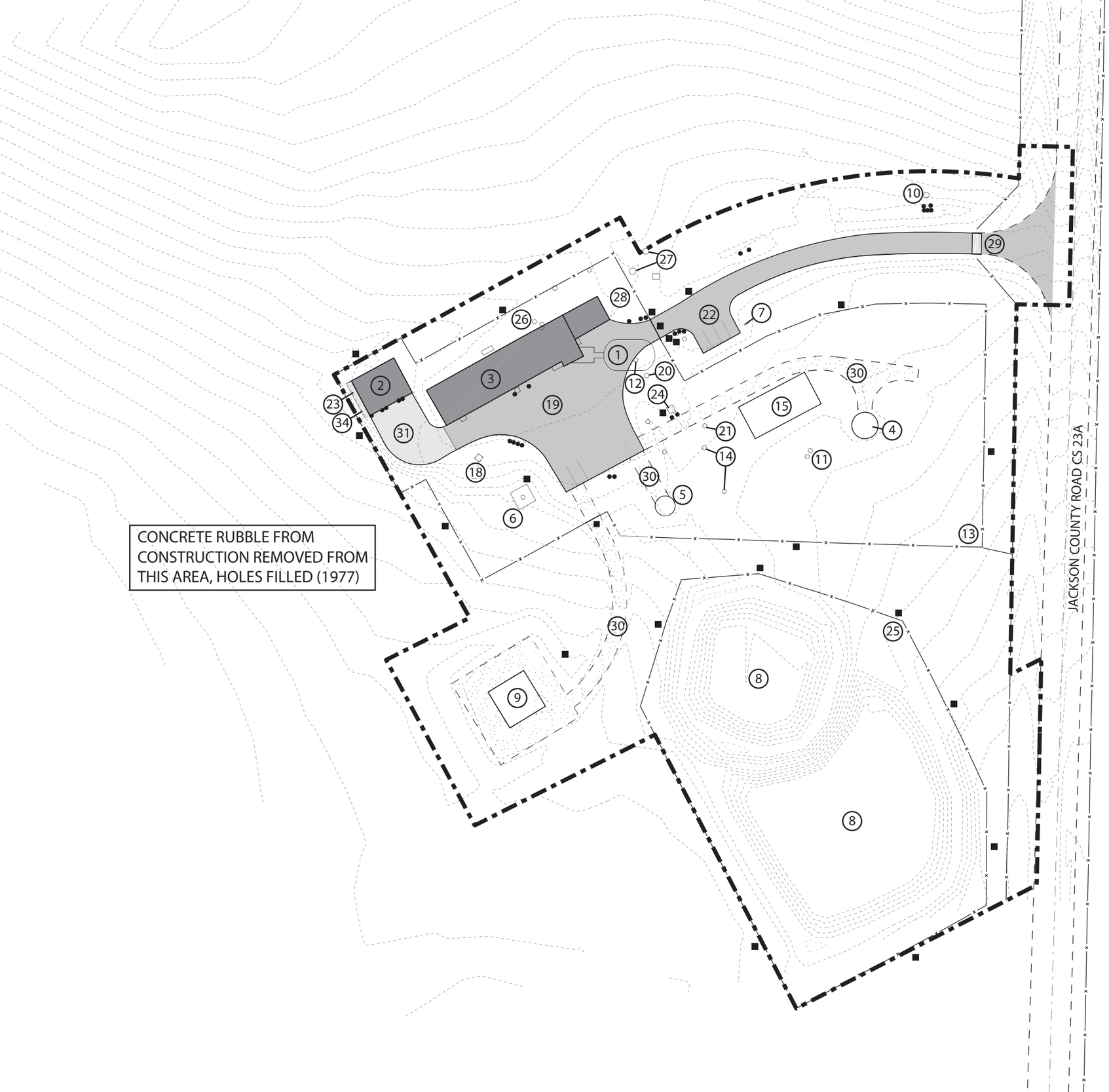
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, LCS, 2009

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DELTA-01 1971-1993 CONDITIONS



0 40 80 160 240 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna (Deactivated 1970s)
5 Hardened HF Receive Antenna (Deactivated 1988)
6 Hardened UHF Antenna (1976)
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier (1982)
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards •
17 Warning Signs ■
18 Well & Water Tanks
19 Access Road & Parking Area
20 Flagpole (1986)
21 Television Satellite Dish (1988)
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank (Removed 1993)
29 Cattle Guard
30 Gravel Acess Roads
31 Concrete Driveway
34 Underground Diesel Tank

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
Asphalt
Concrete

SOURCES

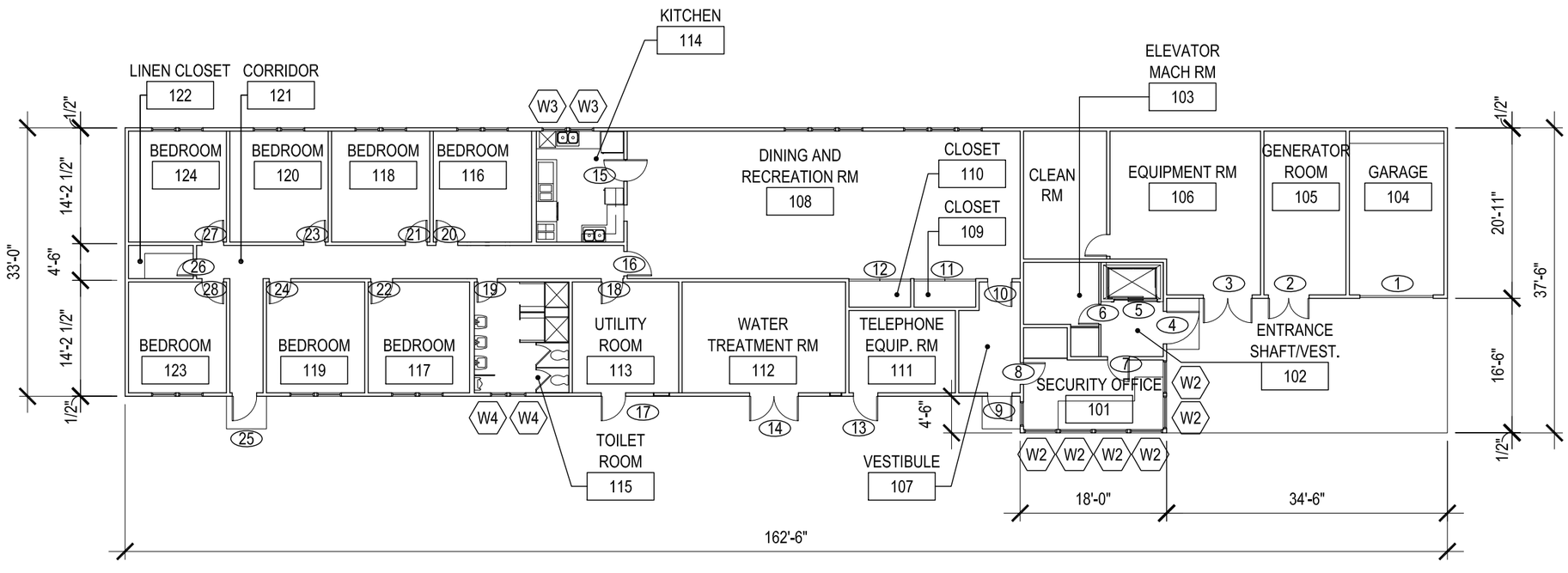
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, LCS, 2009

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NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
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DELTA-01 FLOOR PLANS
1963 - 1971
EPISODE 1



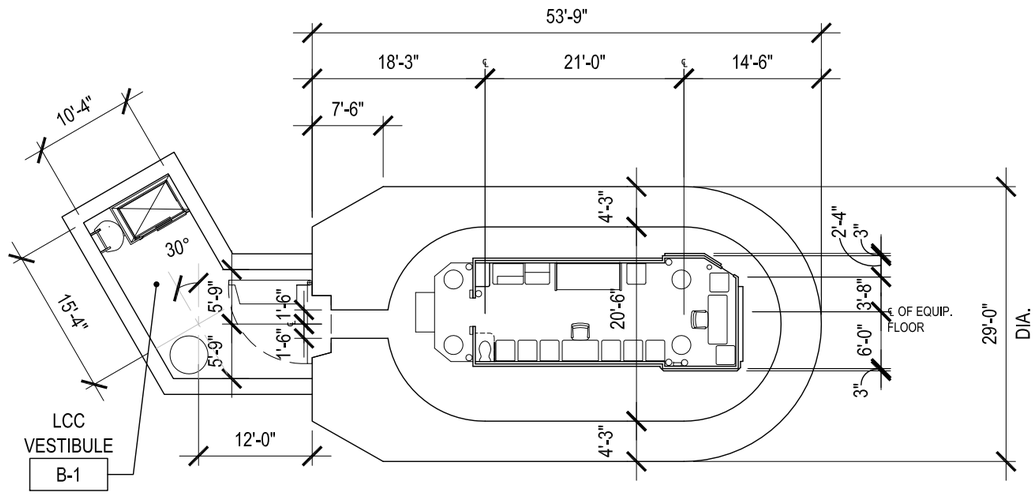
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NORTH

GENERAL NOTES

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1 LAUNCH CONTROL SUPPORT BUILDING FLOOR PLAN



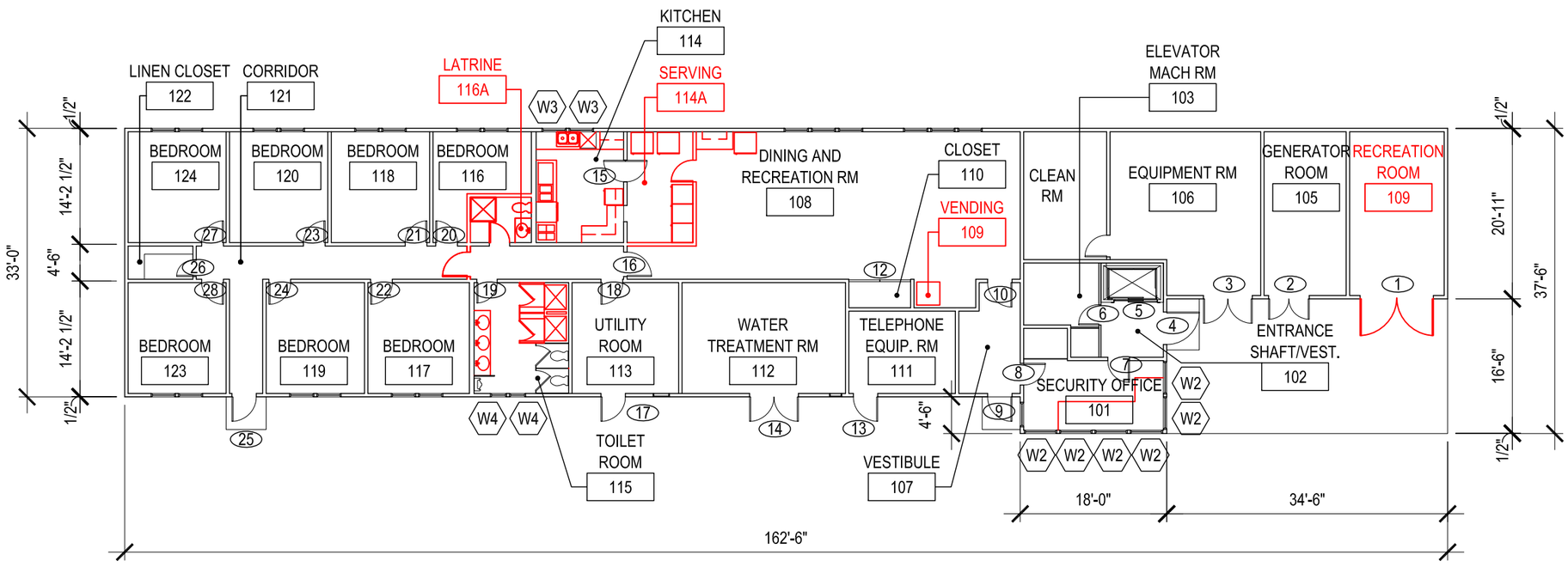
2 LAUNCH CONTROL CENTER FLOOR PLAN

QUINN EVANS
ARCHITECTS

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

DELTA-01 FLOOR PLANS
1971 - 1993
EPISODE 2



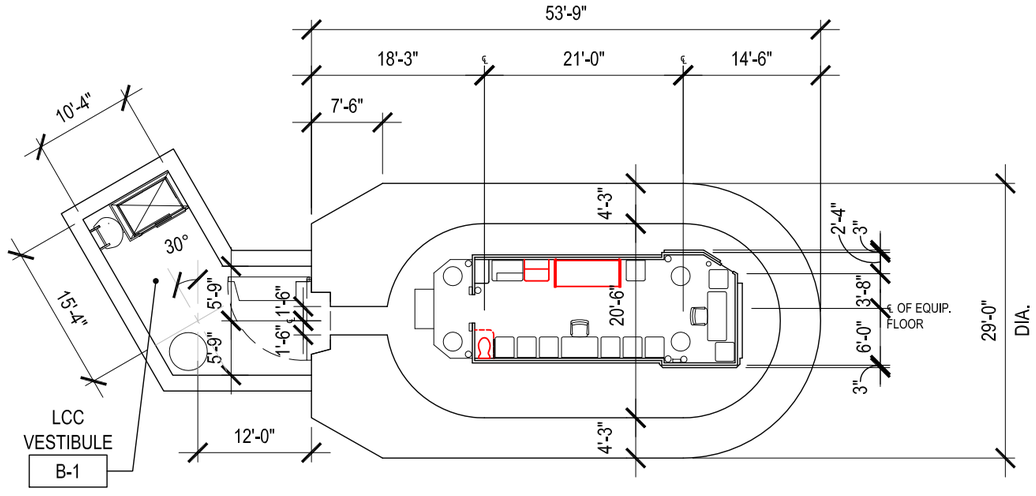
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NORTH

GENERAL NOTES

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1 LAUNCH CONTROL SUPPORT BUILDING FLOOR PLAN



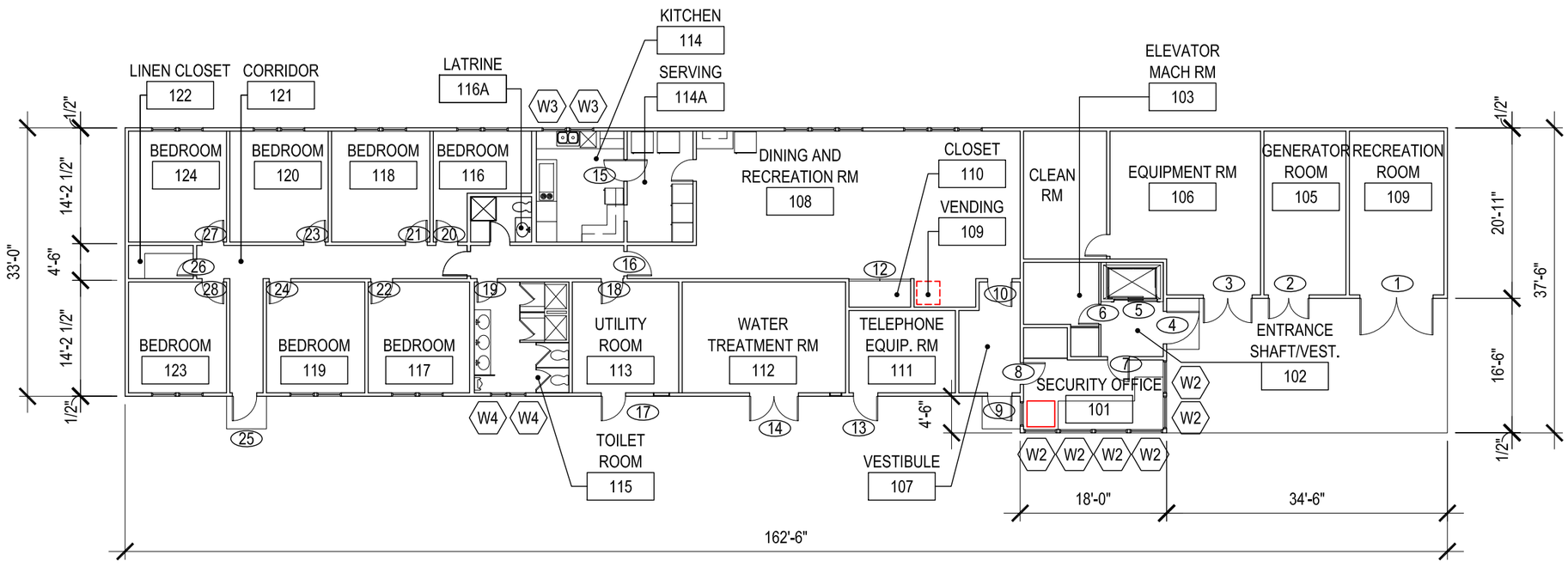
2 LAUNCH CONTROL CENTER FLOOR PLAN

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JACKSON COUNTY, SOUTH DAKOTA

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DELTA-01 FLOOR PLANS
1993 - PRESENT
EPISODE 3



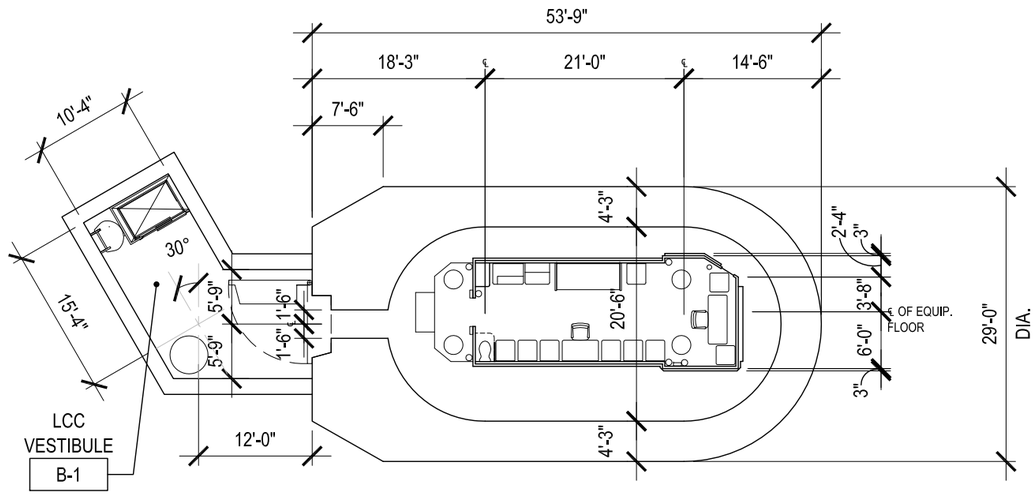
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1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES

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1 LAUNCH CONTROL SUPPORT BUILDING FLOOR PLAN



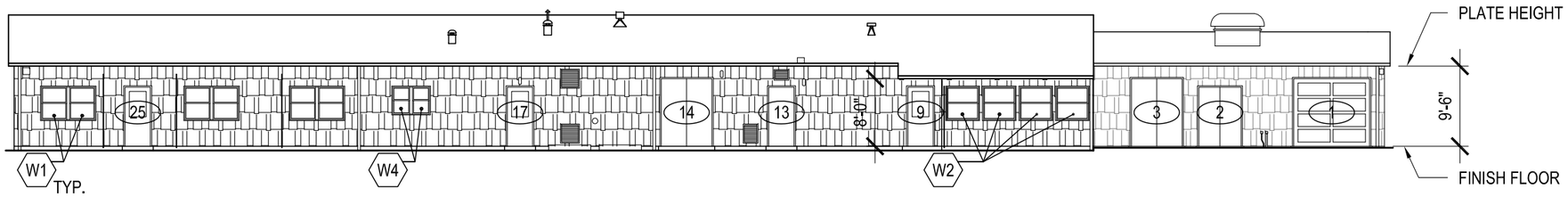
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QUINN EVANS ARCHITECTS

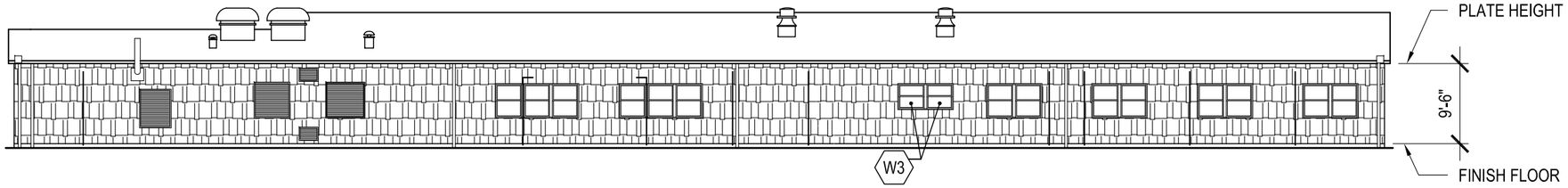
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NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

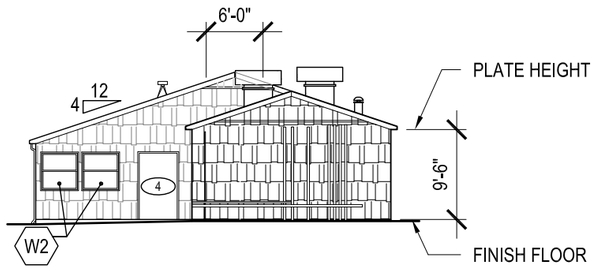
DELTA-01 ELEVATIONS
1963 - 1971
EPISODE 1



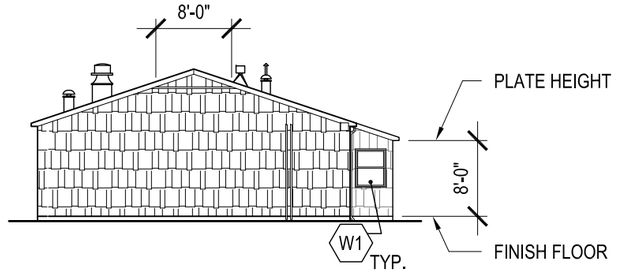
1 SOUTH ELEVATION



2 NORTH ELEVATION



3 EAST ELEVATION



4 WEST ELEVATION

16 8 0 16 32
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES

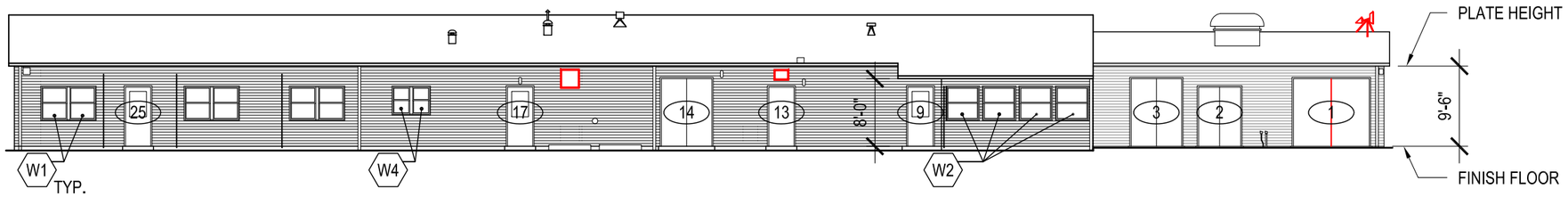
1. ALL WINDOWS ARE WINDOW TYPE W/1 UNLESS NOTED OTHERWISE.

QUINN EVANS
ARCHITECTS

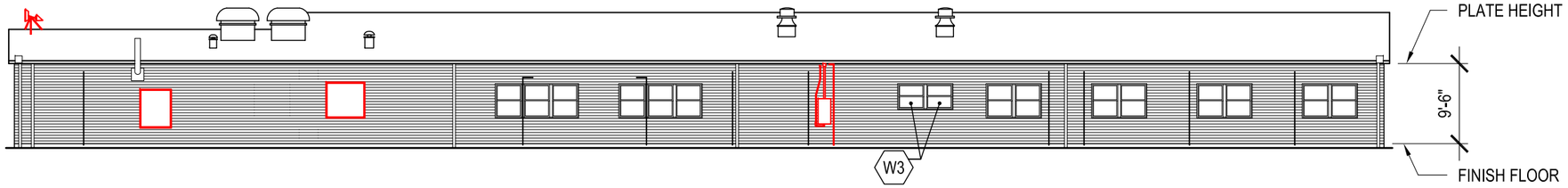
MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

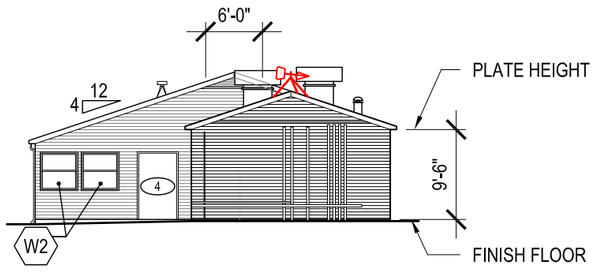
DELTA-01 ELEVATIONS
1971 - 1993
EPISODE 2



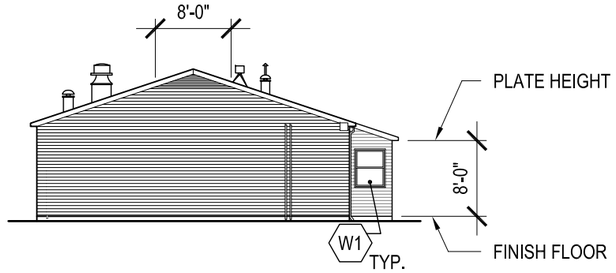
1 SOUTH ELEVATION



2 NORTH ELEVATION



3 EAST ELEVATION



4 WEST ELEVATION

16 8 0 16 32
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES

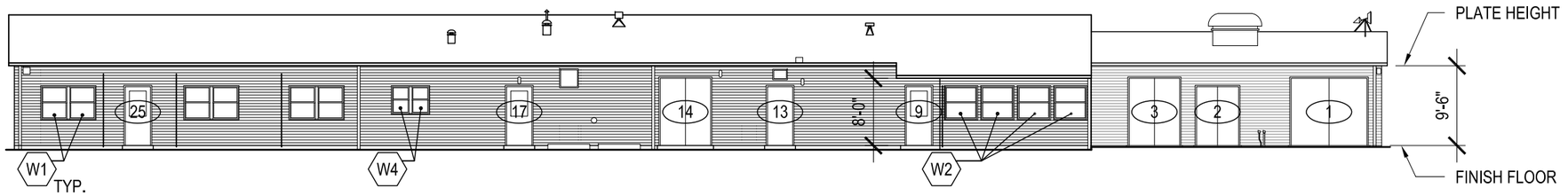
1. ALL WINDOWS ARE WINDOW TYPE W/1 UNLESS NOTED OTHERWISE.

QUINN EVANS
ARCHITECTS

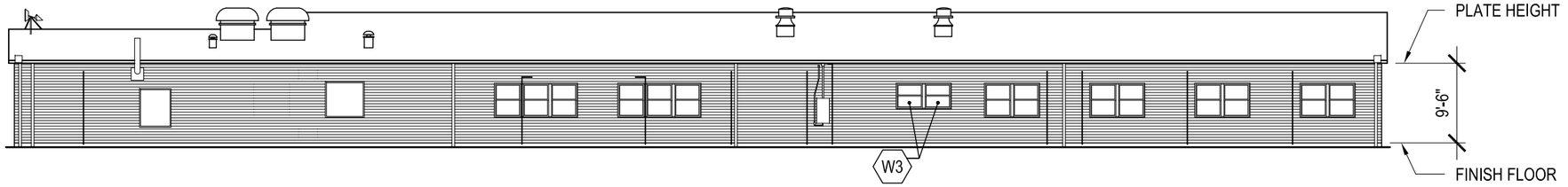
MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

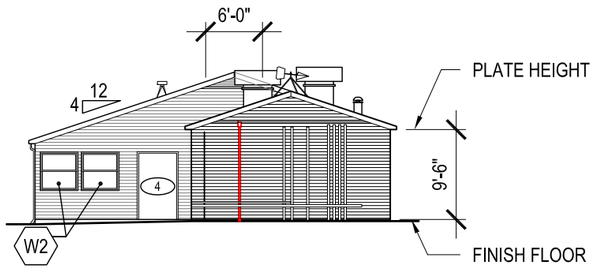
DELTA-01 ELEVATIONS
1993 - PRESENT
EPISODE 3



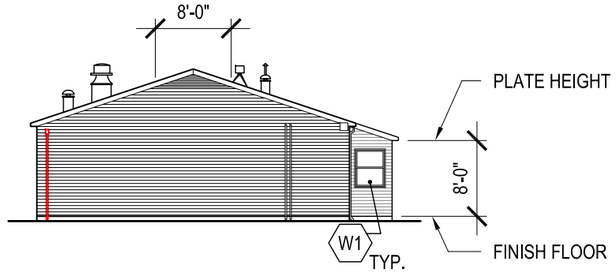
1 SOUTH ELEVATION



2 NORTH ELEVATION



3 EAST ELEVATION



4 WEST ELEVATION

16 8 0 16 32
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES

1. ALL WINDOWS ARE WINDOW TYPE W/1 UNLESS NOTED OTHERWISE.

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MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
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DELTA-09 PRE-1963 CONDITIONS

0 20 40 80 120 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Missile Launcher
2 Launch Facility Support Building
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Asphalt
Concrete

SOURCES

LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

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JACKSON COUNTY, SOUTH DAKOTA

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DELTA-09 1963-1971 CONDITIONS

0 20 40 80 120 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Missile Launcher (1962)
2 Launch Facility Support Building (1962)
4 Hardened UHF Antenna (1968)
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Asphalt
Concrete

SOURCES

LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

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JACKSON COUNTY, SOUTH DAKOTA

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DELTA-09 1971-1993 CONDITIONS

0 20 40 80 120 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Missile Launcher (1993 - Removed) (2001 - Trainging missile installed and glass viewing enclosure constructed over the silo)
2 Launch Facility Support Building (1962)
3 IMPSS Antenna (1989)
4 Hardened UHF Antenna (1968)
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier (1982)
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Asphalt
Concrete

1980s SITE REGRADED

SOURCES

LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

QUINN EVANS ARCHITECTS

MINUTEMAN MISSILE

NATIONAL HISTORIC SITE

JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA

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DELTA-09 FLOOR PLANS

1963 - 1971

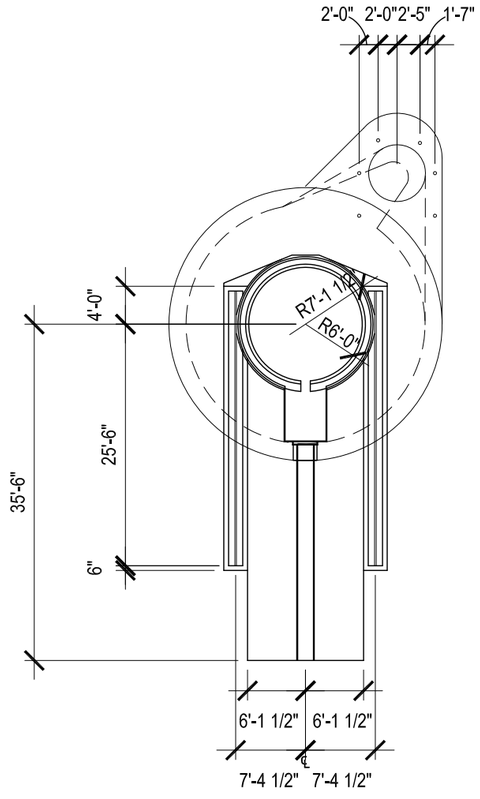
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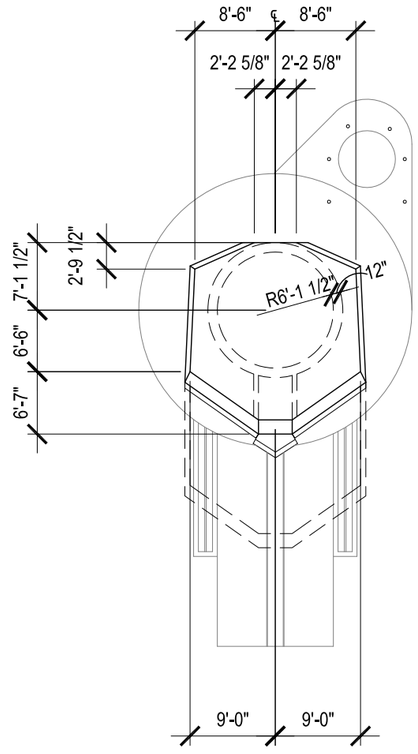
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES



1 FLOOR PLAN



2 ROOF PLAN

QUINN EVANS ARCHITECTS

MINUTEMAN MISSILE

NATIONAL HISTORIC SITE

JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA

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DELTA-09 FLOOR PLANS

1971 - 1993

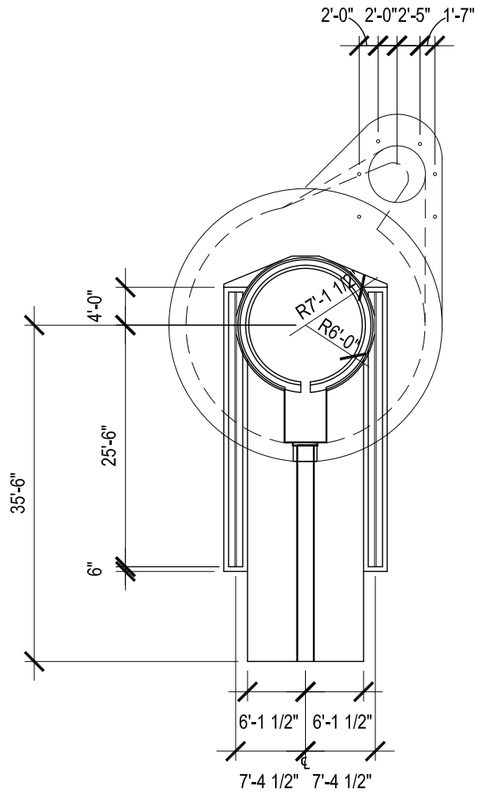
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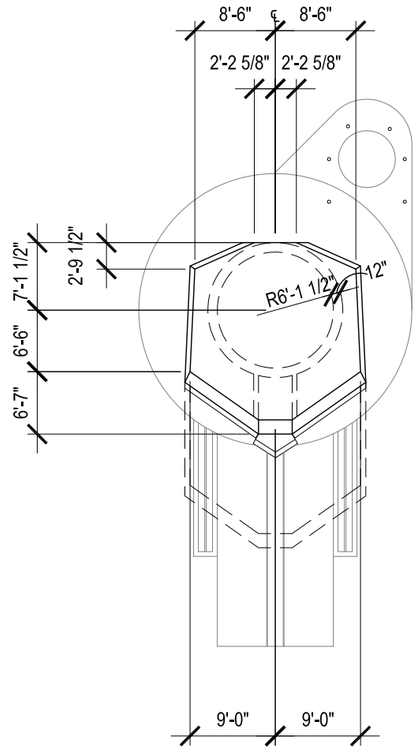
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES



1 FLOOR PLAN



2 ROOF PLAN

QUINN EVANS ARCHITECTS

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

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DELTA-09 FLOOR PLANS

1993 - PRESENT

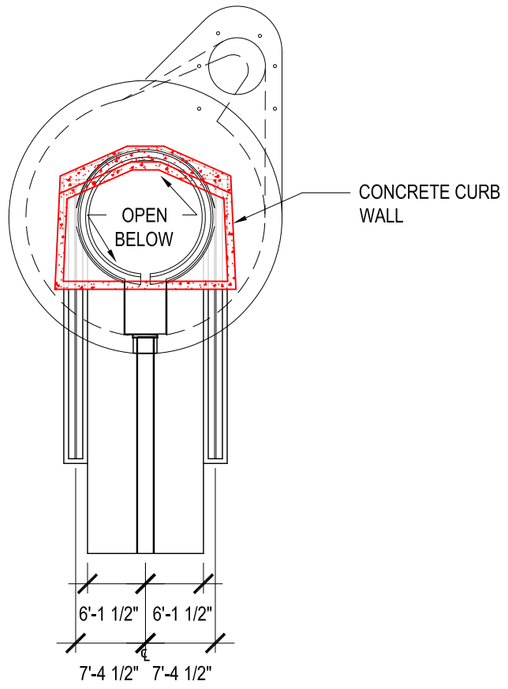
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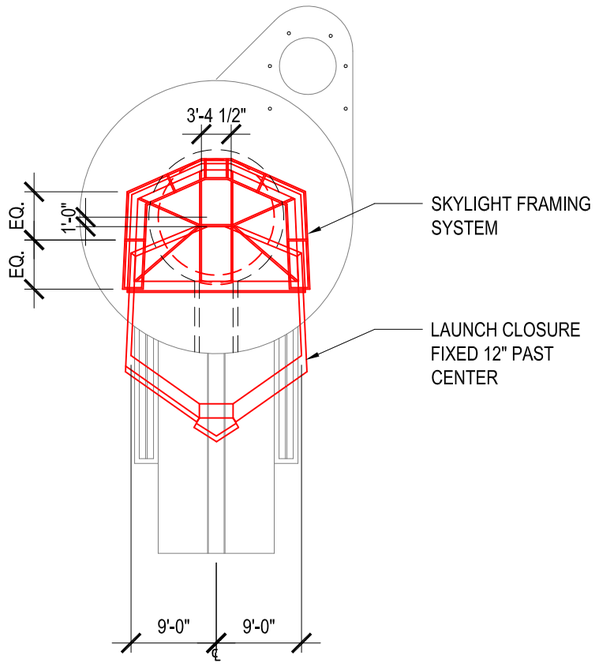
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES



1 FLOOR PLAN



2 ROOF PLAN

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Chapter 3: Existing Conditions / Affected Environment

Chapter 3: Existing Conditions/Affected Environment

Introduction

The *Secretary of the Interior's Standards for the Treatment of Historic Properties* require a comprehensive understanding of the current conditions to provide a baseline for the development of treatment recommendations. This chapter provides a thorough inventory of the existing conditions of the environmental context, cultural resources (including cultural landscapes, buildings, and archeological sites), wildlife, socioeconomics, visitor experience, and park operations related to the Delta-01 and Delta-09 sites.

Cultural landscapes are natural landscapes that have developed through interventions by cultural groups. Landscape characteristics are the tangible and intangible aspects of cultural landscapes that individually and collectively aid in understanding the value of a landscape as a cultural resource.[1] For each of the two cultural landscapes at Minuteman Missile National Historic Site, the following landscape characteristics are described: spatial organization, land use, circulation, topography and views, vegetation, buildings and structures (within their landscape setting), small scale features, and archeological resources. In addition, views to other former missile sites are discussed.

Buildings are described according to four categories including exterior envelope, interior architecture and finishes, structural systems and building systems.

Minuteman Missile National Historic Site is located in rural South Dakota about seventy miles east-southeast of Rapid City. Built in accordance with the U.S. Air Force dispersal policy, Delta-01 Launch Control Facility and Delta-09 Launch Facility lie approximately ten miles apart. During operation, the two sites were linked by a system of blast-proof underground cables and a radio communications network known as the Hardened Intersite Cable System (HICS). Although now decommissioned and disarmed, Delta-01 and -09 facilities are preserved as Minuteman Missile National Historic Site to interpret the use of Minuteman Ib and II intercontinental ballistic missile systems in the United States as part of the United States nuclear missile defense program during the Cold War era.

The Delta flight facilities were part of the 66th Missile Squadron that included five launch control facilities and fifty launch facilities (see figure 3-2). The 66th Missile Squadron was one of three squadrons that made up the 44th Missile Wing in South Dakota (see figure 3-1).

[1] Page, Gilbert and Dolan, A *Guide to Cultural Landscape Reports*, 5-6.

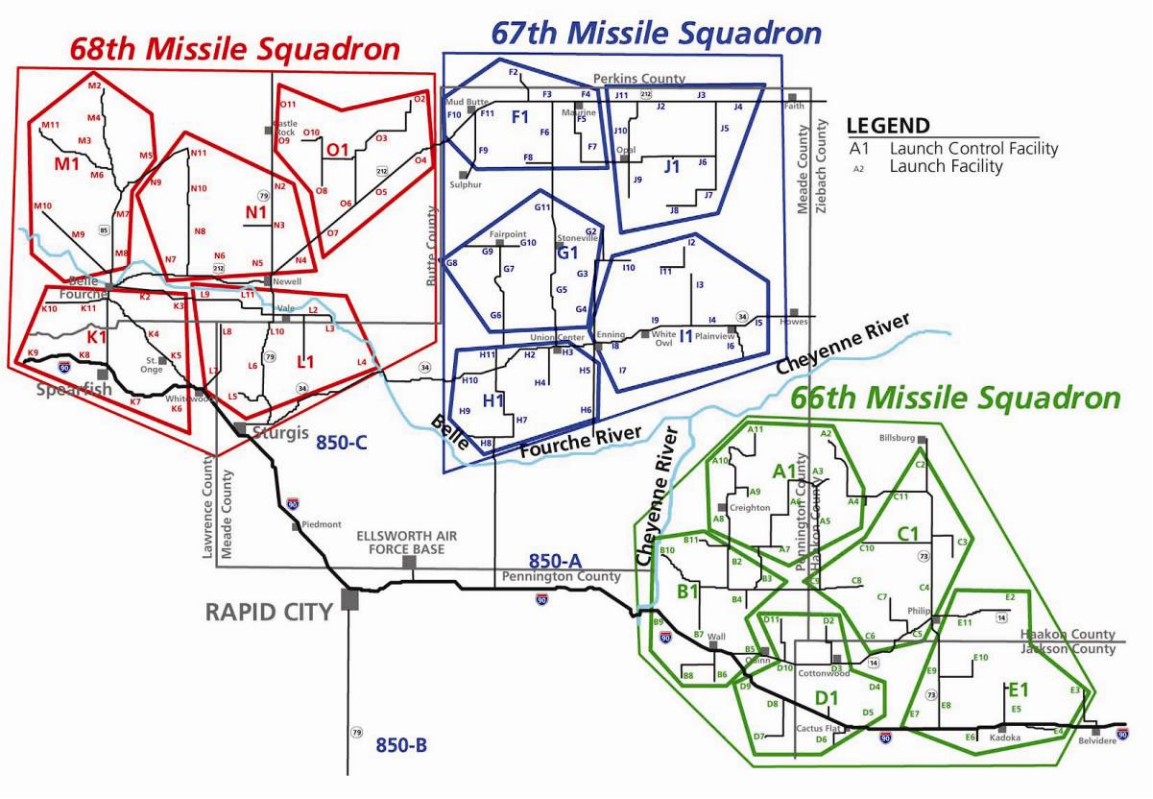


Figure 3- 1: 44th Missile Wing (source: MIMI digital file "44th Missile Wing Map")

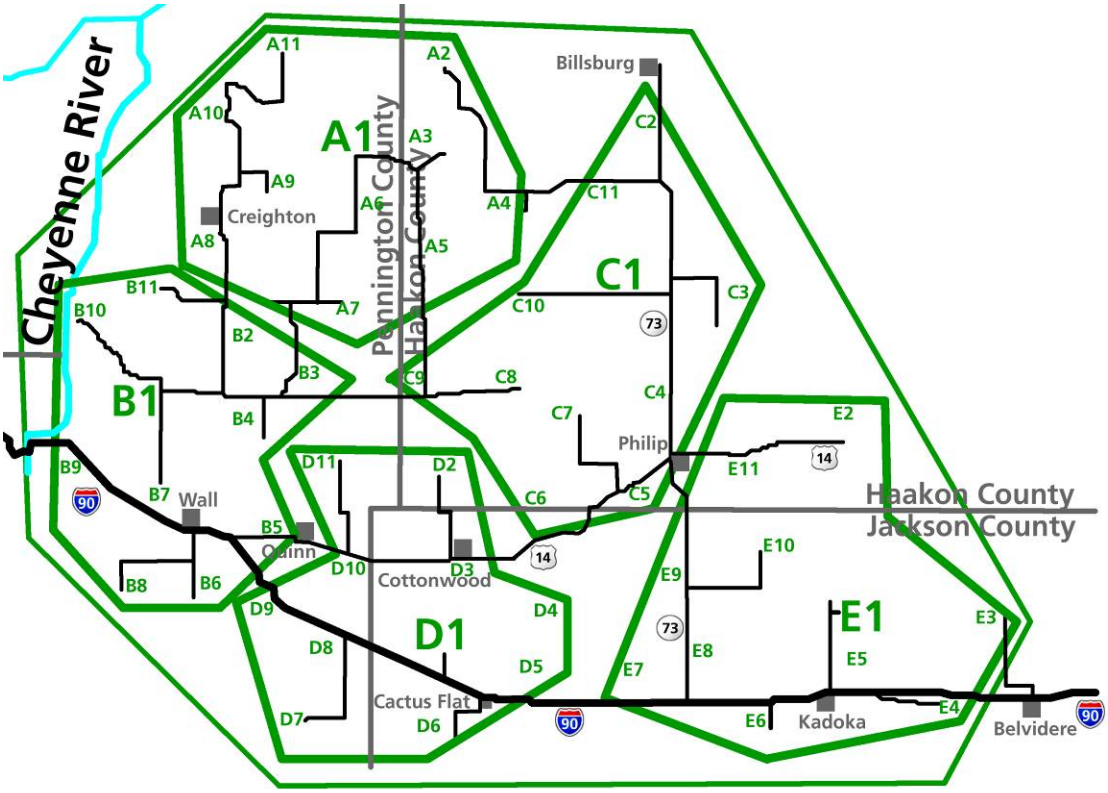


Figure 3- 2: 66th Missile Squadron (source: MIMI digital file "44th Missile Wing Map")

Environmental Context and Natural Systems

The Delta-01 Launch Control Facility and Delta-09 Launch Facility are both situated in the northern Great Plains physiographic province, a region typified by open rolling mixed-grass prairie. The dominant grass species are medium-height warm season grasses such as western wheatgrass (*Pascopyrum smithii)* and green needlegrass (*Nassella viridula)*. Short grasses such as blue gramma *(Bouteloua gracilis)* and buffalograss *(Bouteloua dactyloides)* may dominate localized areas, particularly during times of stress. Forbs commonly associated with the mixed grasses include scarlet globemallow (*Sphaeralcea coccinea)*, American vetch (*Vicia americana)*, prickly pear *(Opuntia)*, and fringed sagewort *(Artemisia frigid)*. Shrubs and trees are usually restricted to draws, gullies, and areas of surface water.

Elevations near Delta-01 range from about 2,550 to 2,565 feet above sea level. At Delta-09 elevations extend from approximately 2,550 to 2,700 feet above sea level. The South Dakota badlands lie to the south of both sites. Geologic formations similar to those found in Badlands National Park are visible along the southern horizon from the Delta sites.

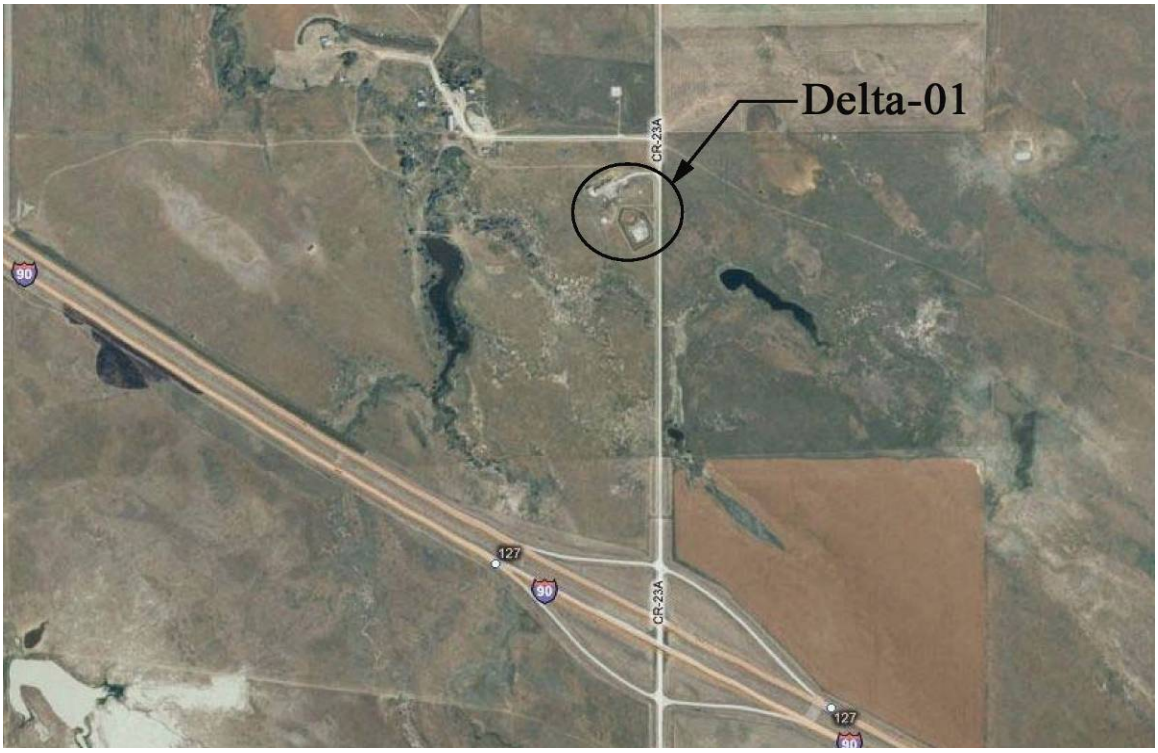


Figure 3- 3: Aerial view of Delta-01 and surrounding area, 2009
(source: http://maps.live.com, 4/29/2009).



Figure 3- 4: Aerial view of Delta-09 and surrounding area, 2009
(source: http://maps.live.com, 4/29/2009).

Environmental Assessment Impact Topics

Cultural Resources

Cultural resources at Minuteman Missile National Historic Site include cultural landscapes, buildings and structures, archeological resources, ethnographic resources, and museum objects/collections. Ethnographic resources and museum objects/collections have been dismissed because there is very little likelihood that alternatives generated by the plan will impact these resources. The remainder are being documented and analyzed because there will be impacts from the treatment alternatives.

Existing Conditions: Cultural Landscapes

Delta-01 Landscape Existing Conditions

Description of the Delta-01 Site

Launch Control Facility Delta-01 consists of 6.4 acres of land with approximately 1.9 acres located inside a chain-link security fence topped with barbed wire (see figure 3-5, Delta-01 Existing Conditions Site Plan). The site is situated in a rural setting surrounded by prairie ranch land utilized for pasture. Horses, donkeys, and cows graze adjacent to the security fence. A small electric fence was added recently north of the site access drive to discourage livestock from damaging cars and equipment. A ranch, including a residence

and several small outbuildings, is located northwest of the site. Interstate 90 and a billboard are visible to the south.

Vegetation includes mixed native grasses. The terrain at the site rises gradually toward the north. The site is located on the west side of Jackson County Road CS 23A, approximately one half mile north of Interstate Highway 90, exit 127. Jackson County Road CS 23A is an improved gravel road, prone to washouts and potholes (see figure 3-6).

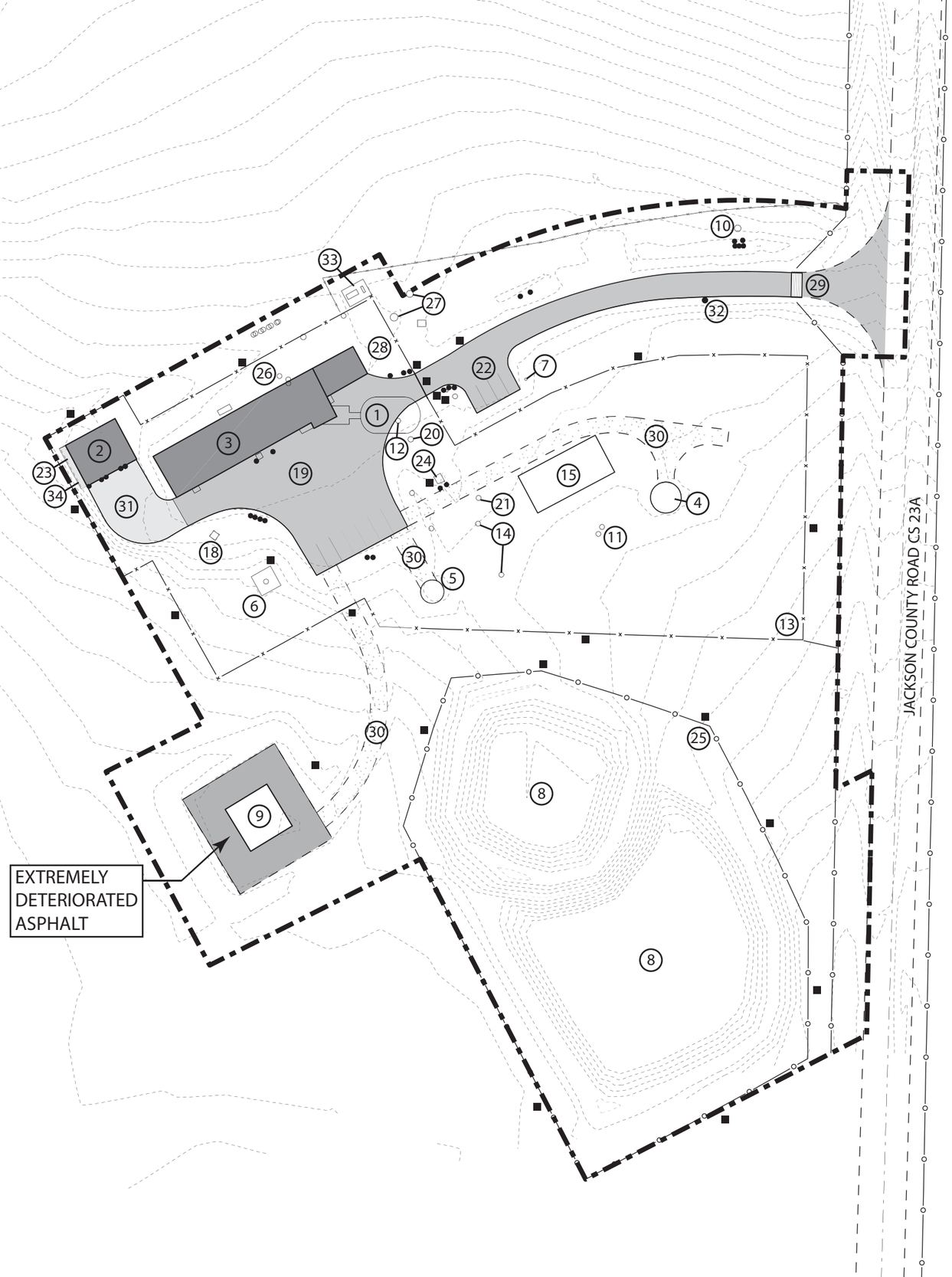
Next page:

Figure 3- 5: Delta-01 Existing Conditions Site Plan (source: QEA September 2009).

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

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DELTA-01 EXISTING CONDITIONS



0 40 80 160 240 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards •
17 Warning Signs ■
18 Well & Water Tanks
19 Access Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Underground Diesel Tank

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel
Asphalt
Concrete

SOURCES

TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, LCS, 2009

QUINN EVANS
ARCHITECTS



Figure 3- 6: Jackson County Road CS23A, facing northwest, Delta-01 is in the left portion of the image, also note cell tower, June 2009 (source: QEA 3155)

Spatial Organization, Delta-01

The buildings and landscape features at Delta-01 are arranged in a linear pattern running from northeast to southwest. The heated vehicle storage building is at the western end of the buildings. Landscape features are arranged throughout the site, in a layout designed to simplify implementation, maintenance, and day to day operations. Although not visible on the landscape, the underground facilities influenced the historic placement of landscape elements and continue to affect where contemporary landscape elements may be situated in the future.

The central core of the site is compact and enclosed by a chain-link security fence. The remaining features are protected from livestock by ranch fences, a cattle-guard, and a low voltage electric fence.

Land Use, Delta-01

Land within the security fence at Delta-01 is used solely for the protection and interpretation of the historic resources. NPS staff accompany all visitors within this area, conducting regular tours and interpretive programs. Other areas are fenced to prevent livestock from entering. The unfenced portions of the property are used for grazing by livestock from the adjacent ranch. A small portion of the grazing land is owned by the NPS, the remainder is privately owned.

The access drive to the site is located on tract FD100 E-1, which is an easement allowing a permanent access road, utility lines, and water pipes. The adjacent rancher retains the right to cross over the tract to move machinery, equipment and livestock to their adjoining land.[2]

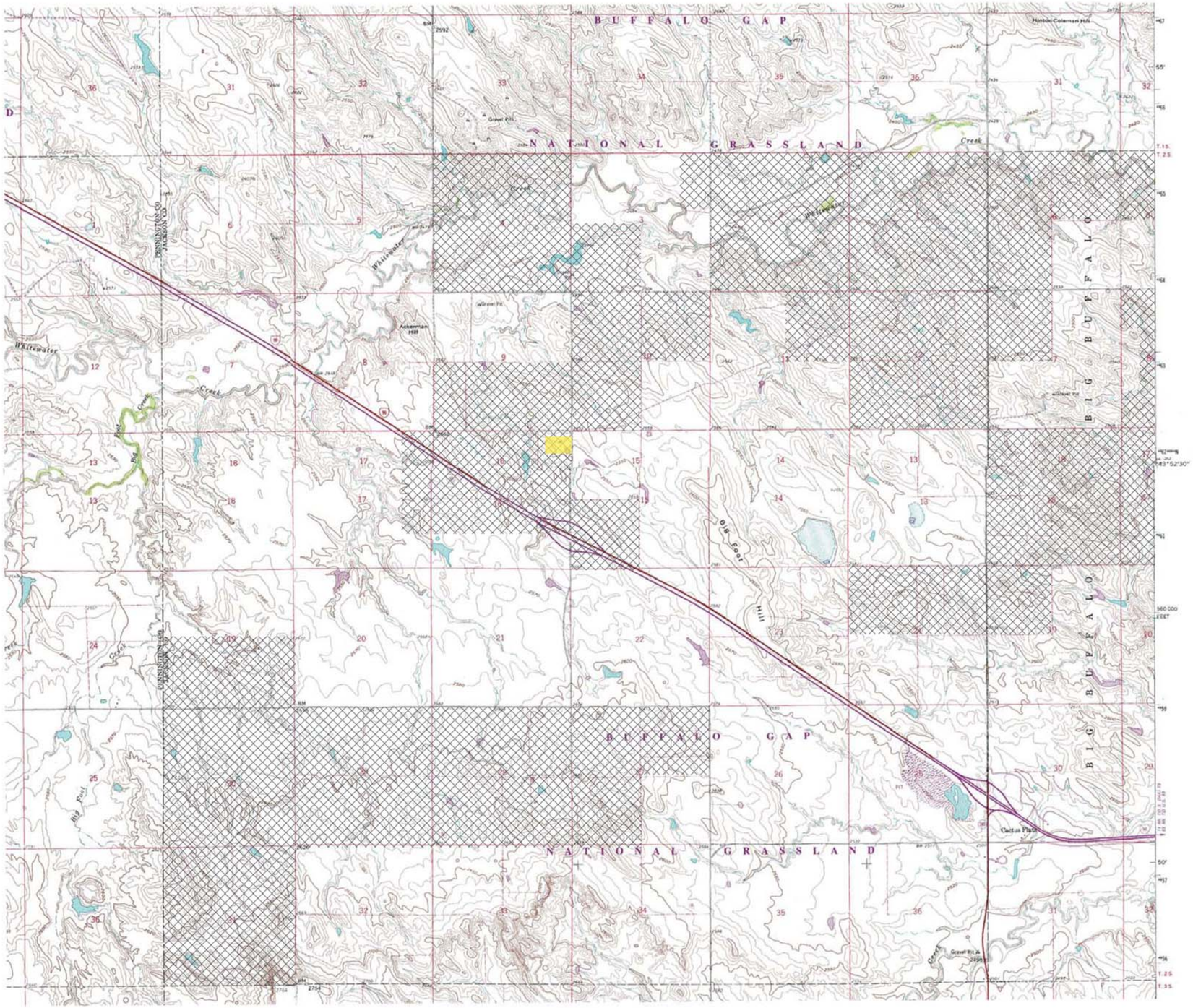
[2] "Launch Control Facility (LCF) D-1 Transfer to Park Service Pursuant to Public Law 106-115,"

The land immediately adjacent to the northern, western, and southern boundaries of Delta-01 is privately owned, as are several large tracts that are within the historic views of the facility (see figure 3-7). The eastern boundary of the site is delineated by Jackson County Road CS23A. The remainder of the landscape within view of Delta-01 is publically owned as part of Buffalo Gap National Grassland.

Next page

Figure 3- 7: Delta-01 Existing Property Ownership Plan (source: QEA September 2009).

Minuteman Missile Archives Document 660/D-5.



MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

DELTA-01 EXISTING OWNERSHIP

0 1000 3000 5000 7000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

Privately Owned Land

Approximate location of Delta-01

SOURCES

USGS MAP
JACKSON COUNTY TRACT MAPS

QUINN EVANS | ARCHITECTS

Circulation, Delta-01

Vehicular and pedestrian circulation at the site is controlled by the security fence that surrounds the main resources. Vehicles approach the site from Interstate Highway 90 and head north on Jackson County Road CS 23A. The site access road is paved with asphalt and extends from CS 23A to the west. Parking for four vehicles is provided on the south side of the access road, near the entrance gate. The entrance gate is kept locked when NPS personnel are not present. The vehicular entrance is used by NPS and service vehicles.

Once visitors are within the fence, interpreters provide information about the facility, features on site, and answer questions before guiding visitors to the Launch Control Facility support building.

Topography and Views, Delta-01

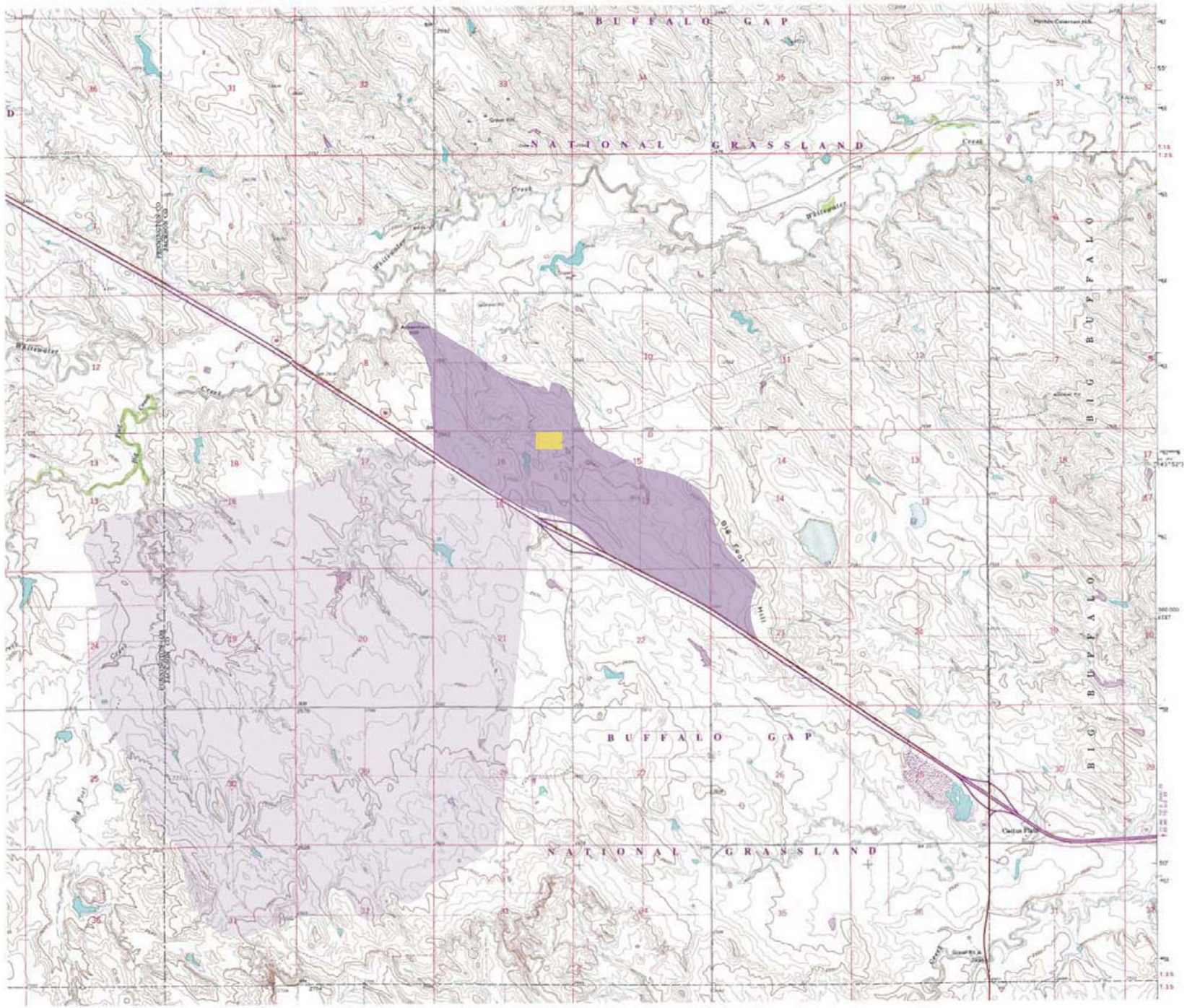
The slopes on the site average from two-percent to approximately five-percent, creating a fairly level terrain that rises gradually to the north. The grades surrounding the sewage lagoons are steeper, with side slopes of about twenty-five percent. The lagoons lie about 240 feet southeast of the Launch Control Facility support building. The northern-most lagoon is an open settling basin, 118 feet square, surrounded by an eight-foot-high earthen berm. The southern lagoon is an overflow lagoon with an irregular shape appended to the southeastern side of the northern lagoon.[3]

Since the complex is situated on a south-facing slope, the main views from the facility are to the south, as illustrated in figure 3-8. The surrounding topography continues to gradually descend toward the south, with Interstate Highway 90 providing the only large-scale, non-topographic feature within view. In this way, Interstate 90 provides a barrier defining the southern boundary of the foreground view from Delta-01. A rise in the topography to the north, east and west defines foreground views in those directions. Topographic formations ranging from 2650 to 2700 feet above sea level create edges to the broad reaching, or background views to the south.

[3] Slattery, Ebeling, Pogany, and Squitieri, "The Missile Plains: Frontline of America's Cold War,"(Historic Resource Study), 87.

Next page:

Figure 3- 8: Delta-01 Existing Views (source: QEA September 2009).



MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

DELTA-01 EXISTING VIEWS

0 1000 3000 5000 7000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

Delta-01 Foreground Views

Delta-01 Background Views

Approximate location of Delta-01

SOURCES

USGS MAP
QE|A FIELD INVESTIGATIONS, JUNE 2009

QUINN EVANS | ARCHITECTS

Vegetation, Delta-01

The Delta-01 Launch Control Facility is situated in the northern Great Plains physiographic province, a region typified by open rolling mixed-grass prairie. The area surrounding Delta-01 includes grasslands, lagoons, and several permanent wetlands (these are not within the site boundary). An intermittent stream south of the property has Russian olive trees (*Elaeagnus angustifolia*) growing along the stream banks. A recent study identified 79 vascular plant species at Delta-01, the majority of which are native to the United States. These include graminoids such as buffalo grass (*Bouteloua dactyloides)* and needleleaf sedge (*Carex duriuscula*), forbs (e.g., prairie coneflower (*Ratibida columnifera),* slimflower scurfpea (*Psoralidium tenuiflorum),* and white heath aster (*Symphyotrichum ericoides)*), and cacti shrubs (*Opuntia sp).*[4] Medium-height warm season grasses include western wheatgrass (*Pascopyrum smithii)* and green needlegrass (*Nassella viridula).* Short grasses such as blue gramma *(Boutelous gracilis)* and buffalograss (*Bouteloua dactyloides)* may dominate localized areas, particularly during times of stress. Throughout the region shrubs and trees are generally restricted to draws, gullies, and areas of surface water. At Delta-01 the only woody plants noted were Siberian elm (*Ulmus pumila)* at the lagoons.

Buildings and Structures, Delta-01

Three primary structures are present on the site including the Launch Control Facility Support Building (HS103, IDLCS 100477), the heated vehicle storage building (HS 102, IDLCS 100479), and the Underground Launch Control Center (HS 101, IDLCS 100478). The Architectural, Structural and Cathodic Protection Existing Conditions sections of this chapter includes detailed information about the building conditions.

[4] Wilson, Gitzen and Bynum, *Vertebrate and Floristic Inventories at Minuteman Missile National Historic Site.*

Small Scale Features, Delta-01

Table 3-1: Delta-01 Small Scale Landscape Features

Small Scale Features	Description/Condition	Figure #
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	*Blast-hardened antenna, constructed in 1963, deactivated in early-1970s. Includes underground, reinforced-concrete cylinder, approximately twenty-one feet in diameter and fifty feet deep. Cylinder well contains a telescoping, four-sided radio antenna that was capable of extending to a maximum height of 120 feet.[5] The antenna is in good condition.*	**3-10**
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	*The antenna is set into the ground about 160 feet south-southeast of the LCF support building. Built in 1963, the structure consists of a reinforced-concrete cylinder covered by a concrete cap and measuring approximately sixteen feet in diameter and thirty-seven feet deep (outside dimensions). Five small ports are distributed evenly around the perimeter of the structure. Each port contained a slender, ballistically actuated, steel, monopole antenna. The antenna system was deactivated circa 1987-88.[6] The antenna is in good condition.*	**3-11**
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	*The hardened UHF antenna is located near the southwest corner of the LCF support building. It consists of a massive, cast-steel frustum, bolted to a thick, reinforced-concrete slab sixteen feet square. A conical, white fiberglass weather dome surmounts the frustum. The antenna was installed in 1976. The antenna is in good condition.*	**3-12**
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	*Installed in 1968, the SLFCS antenna is buried in the ground about 140 feet east of the LCF support building and is not visible from the surface. The antenna is in good condition.*	**Not visible on surface, see map for location.**
Cathodic protection rectifier (HS 110, IDLCS 100485)	*Electronic device installed in 1982 to protect underground features from corrosion. Located outside the security fence on the north side of the access road. The aboveground portion includes a white-painted steel electrical box mounted on a wood pole. The below ground portion is a well approximately 220 feet deep, containing eleven graphite anodes. The rectifier is in poor condition.*	**3-13**

[5] Slattery, Ebeling, Pogany, and Squitieri, "The Missile Plains: Frontline of America's Cold War,"(Historic Resource Study), 86.
[6] Ibid.

Small Scale Features, cont.	Description/Condition	Figure #
Two sewage lagoons (HS 108, IDLCS 100486)	*Northern lagoon is the primary structure which is roughly square with sides oriented at approximately a 30 degree angle from north/south. The southern lagoon is the secondary structure and is an odd shape, wrapping around the southeast corner of the primary lagoon. Both structures have earthen berms surrounding their sides to detain settlement materials. The lagoons are in good condition.*	**3-14**
Helicopter pad (HS 109, IDLCS 100485)	*Square concrete pad outside security fence on raised platform. Access is by graded gravel route from the Launch Control Center parking area. There is an asphalt perimeter around the helipad. The helipad is in good condition.*	**3-15**
ICBM super-high frequency satellite terminal antenna (ISST) (HS 126, IDLCS 754345)	*Installed circa1992, the antenna is located at the rear of the LCF support building. The antenna was installed when the missile sites were being deactivated in Ellsworth's 67th Strategic Missile Squadron. The antenna is in good condition.*	**3-16**
Television satellite dish (HS 121, IDLCS 398298)	*Installed circa 1987-88, the satellite dish is located in the grassy area in front (south) of the LCF support building. The satellite dish is in good condition.*	**3-17**
HICS	*Underground cable connecting Delta-01 to Delta-09. The cable was severed as part of the decommissioning of the site. The cable no longer functions, it is in poor condition.*	**Not visible above ground at Delta-01.**
Security fencing (HS 113, IDLCS 287263)	*Eight-foot high chain-link fence topped with barbed wire. The security fencing is in good condition.*	**3-10, 3-11, 3-12, 3-16, 3-17, 3-20, 3-22, 3-24, 3-25, 3-27**
Sewage lagoon fencing / Livestock fencing (HS 125, IDLCS 754342)	*Four-foot high barbed wire fence with red t-posts. The fences are in good condition.*	**3-14**
Cattle-guard (HS 129, IDLCS 754354)	*Horizontal metal grate at the intersection of the entrance driveway and Jackson County Road CS23A. The cattle-guard is in good condition.*	**3-18**
Electric fence	*Gray t-posts painted red on top and white plastic posts with a single low voltage electrical wire at about two-feet off the ground. Erected by the National Park Service to prevent livestock from damaging vehicles on the entrance drive. The electric fence is in good condition.*	**3-19**
Historic signage (HS 117, IDLCS 354856)	*Brown metal signs with white lettering hung on the security fence, warning signs, and no smoking signs. The signs are in good condition.*	**3-20**

Small Scale Features, cont.	Description/Condition	Figure #
Protective bollards (HS 116, IDLCS 354857)	*Wood and concrete bollards painted brown located near the buildings and other features to prevent damage from large vehicles. The bollards are in good condition.*	**3-21**
Access road and parking area (HS 119, IDLCS 390289)	*Asphalt drive and parking area. The pavement is in fair condition.*	**3-22, 3-23**
Well and water tanks (HS 118, IDLCS 354851)	*Brown metal box approximately four foot square and one foot tall is visible above ground. The portion of the well and water tanks that is visible is in good condition. The condition of the underground features is unknkown.(verify)*	**3-12**
Flagpole (HS 120, IDLCS 398270)	*Metal pole. The flagpole is in good condition.*	**3-23**
Basketball goal (HS 112, IDLCS 287625)	*Metal basketball post with goal. The basketball goal is in good condition.*	**3-23**
Volleyball court (HS 115, IDLCS 287266)	*Sand/dirt court with net supported by metal posts. The volleyball court is in fair condition. There are weeds encroaching into the sand.*	**3-24**
Horseshoe court (HS 114, IDLCS 287261)	*Two u-shaped wood pits with stakes aligned with each other. Grass is growing between the dirt pits. The horseshoe pits are in fair condition.*	**3-25**
Code burner (HS 111, IDLCS 287264)	*Small concrete square flush at the ground is visible. The code burner is in good condition.*	**3-26**
Interpretive wayside	*NPS wayside with historic photographs and text describing the "invisible warriors." Fiberglass panel mounted on aluminum posts. The wayside is in good condition.*	**3-20**
Portable toilet	*Tan plastic portable toilet building. The portable toilet is in good condition.*	**3-16**
Concrete pad, transfer switch, and generator	*Concrete slab and electrical transfer switch, and generator the generator is yellow. The pad, generator and switch are in good condition.*	**3-27**
Ranch	*A ranch complex is located to the northwest of the property. The complex includes a residence and several outbuildings. The ranch pre-dates the Delta-01 implementation and was present the entire time that the site was operational.*	**3-9**
Jackson County Road C23A	*Improved gravel road provides access to Delta-01 site. The road contains many potholes and washouts. It is in poor condition.*	**3-28**



Figure 3- 9: Delta-01 and adjacent ranch, facing northwest, June 2009
(source: QEA 3152 and 3154 combined)



Figure 3- 10: Hardened High Frequency Transmit Antenna, facing northwest, June 2009 (QEA 3438)



Figure 3- 11: Hardened High Frequency Receive Antenna at Delta-01, facing southeast, June 2009 (source: QEA 3385)



Figure 3- 12: Well cap (brown box) and Hardened Ultra High Frequency Antenna (white cone), facing southwest, June 2009 (source: QEA 3354)



Figure 3- 13: Aboveground portion of the cathodic protection rectifier at Delta-01, facing northeast, June 2009 (source: QEA 3468)



Figure 3- 14: Livestock fence with embankment of secondary sewage lagoon behind and Delta-01 buildings in background, facing northwest, June 2009 (source: QEA 3649)



Figure 3- 15: Helicopter landing pad and security fence, facing southwest, June 2009
(source: QEA 3363)



Figure 3- 16: ISST Antenna with portable toilet in background, facing east, June 2009
(source: QEA 3292)



Figure 3- 17: Television satellite dish, facing northeast, June 2009 (source: QEA 3414)



Figure 3- 18: Cattle guard at entrance drive, facing northwest, June 2009 (source: QEA 3472)



Figure 3- 19: Electric fence north of access drive, facing northwest, June 2009 (source: QEA 3453)



Figure 3- 20: Interpretive wayside and historic signs in background, facing northwest, June 2009 (source: QEA 3253)



Figure 3- 21: Wood bollards at Launch Control Facility, facing northwest, June 2009 (source: QEA 3376)



Figure 3- 22: Entrance driveway, parking area, security fence with vehicle gate open, facing west, June 2009 (source: QEA 3161)



Figure 3- 23: Driveway and parking inside security fence, flagpole and basketball goal, facing southwest, June 2009 (source: QEA 3274)



Figure 3- 24: Security fence and volleyball court, facing south, June 2009 (source: QEA 3159)



Figure 3- 25: South end of horseshoe court, facing south, June 2009 (source: QEA 3412)



Figure 3- 26: Code burner, facing southeast, June 2009 (source: QEA 3442)



Figure 3- 27: Concrete pad, transformer and generator, facing southwest, June 2009 (source: QEA 3458)



Figure 3- 28: Jackson County Road CS23A, with Interstate Highway 90 overpass in background, facing south, June 2009 (source: QEA 3627)

Delta-09 Landscape Existing Conditions

Description of the Site, Delta-09

Launch Facility Delta-09 is located approximately ten miles west-northwest of Launch Control Facility Delta-01. The Delta-09 site that is part of Minuteman Missile NHS includes five acres of land. The historic site included 90 acres within the northeast quarter of Section 26, Township 1 South, Range 16 East, including the south half of the northeast quarter of the northeast quarter, the southeast quarter of the northeast quarter, the east half of the east half of the southwest quarter of the northeast quarter, the southeast quarter of the southeast quarter of the northwest quarter of the northeast quarter, the northeast quarter of the northeast quarter of the southeast quarter, the east half of the northwest quarter of the northeast quarter of the southeast quarter, and the northwest quarter of the northwest quarter of the northeast quarter of the southeast quarter.

The site occupies part of an open, grassy landscape adjacent to Pennington County Road T512, about six-tenths of a mile west and south of Interstate 90, Exit 116. The Interstate is visible to the north and northeast of the property. The site and surrounding landscape slope gradually down from the north to the south. Views to the west, south and east present a rural landscape void of developments other than utility poles and the occasional ranch fence.

The core of the site consists of one and one-half acres of land that is surrounded by a chain-link security fence topped with barbed wire. Figure 3-29 illustrates the historic boundary of the property in relation to the core that is surrounded by a security fence. Figure 3-30: Delta-09 Existing Conditions Site Plan, illustrates the site and landscape features.

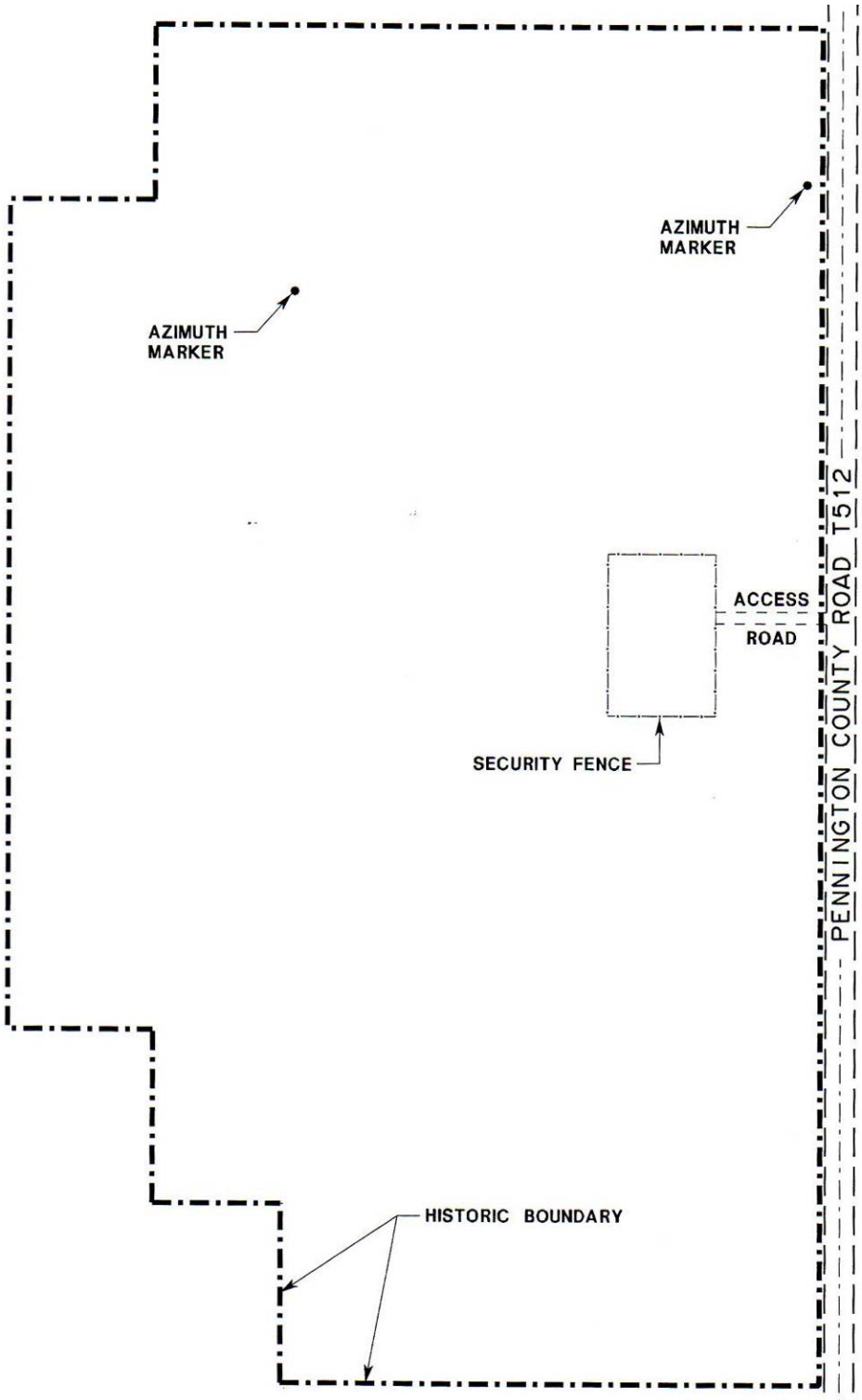


Figure 3- 29: Delta-09 Historic Boundary (source: National Park Service, Modified by Mead & Hunt, Inc., National Register Nomination for Minuteman ICBM Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base)

Next page:
Figure 3- 30: Delta-01 Existing Conditions Site Plan (source: QEA September 2009).

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

DELTA-09 EXISTING CONDITIONS

0 20 40 80 120 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Asphalt
Concrete

SOURCES

LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

QUINN EVANS
ARCHITECTS

The launch structures are located inside the security fence. A double gate is located on the east side of the security fence. A gravel access drive leads from Pennington County Road T512 to the double gate. The county road is an improved gravel road, prone to washouts and potholes.

The missile launcher and Launch Facility support building are located near the southern end of the fenced area. The majority of the structural elements associated with the facility are located underground. The area inside the enclosure includes an elevated gravel platform designed to provide space for the truck-like transporter-erector vehicles to maneuver. These vehicles hauled and emplaced the Minuteman missiles. A rectangular area at the north end of the platform served as a helicopter landing pad and is outlined by four small concrete corner pylons.

Soil at Delta-09 site is of the Comborthids-Argiustolls subgroup and has a clay-like texture. The soil shrinks when dry and expands when wet. In dry weather, this type of soil can develop deep cracks up to two inches wide, a yard long, and several feet deep. Permeability is moderate, and run-off is rapid. The shale bedrock is generally 30 to 60 inches below the surface.[7]

Spatial Organization, Delta-09

Delta-09 consists of approximately 5 acres of land, of which 1.58 acres lie inside the security fence. The fenced area is located approximately half way down the east side of the 5 acre tract and offset to the west of County Road T512 about 200 feet. The structures within the fenced area are mostly clustered in the southern half of the enclosure.

Land Use, Delta-09

Delta-09 is surrounded on the north, west, and south sides by the open landscape of Buffalo Gap National Grassland, under ownership of the United States Forest Service. The National Grassland is used for pasture for livestock. The land directly east of Pennington County Road T512 is privately owned and utilized for pasture. To the far north and east, other privately owned land within view of the facility is mainly utilized for pasture, although views to the west and north include the Interstate Highway, the town of Wall, and private development along the ridge south of Wall. Figure 3-31 illustrates the privately owned land within the area surrounding Delta-09.

Land within the security fence at Delta-09 is used for the protection and interpretation of the historic resources. The access gate is opened daily for independent access by visitors. Visitors who choose to take a tour of the park may be accompanied by NPS staff to the site as part of regularly scheduled interpretive programs.

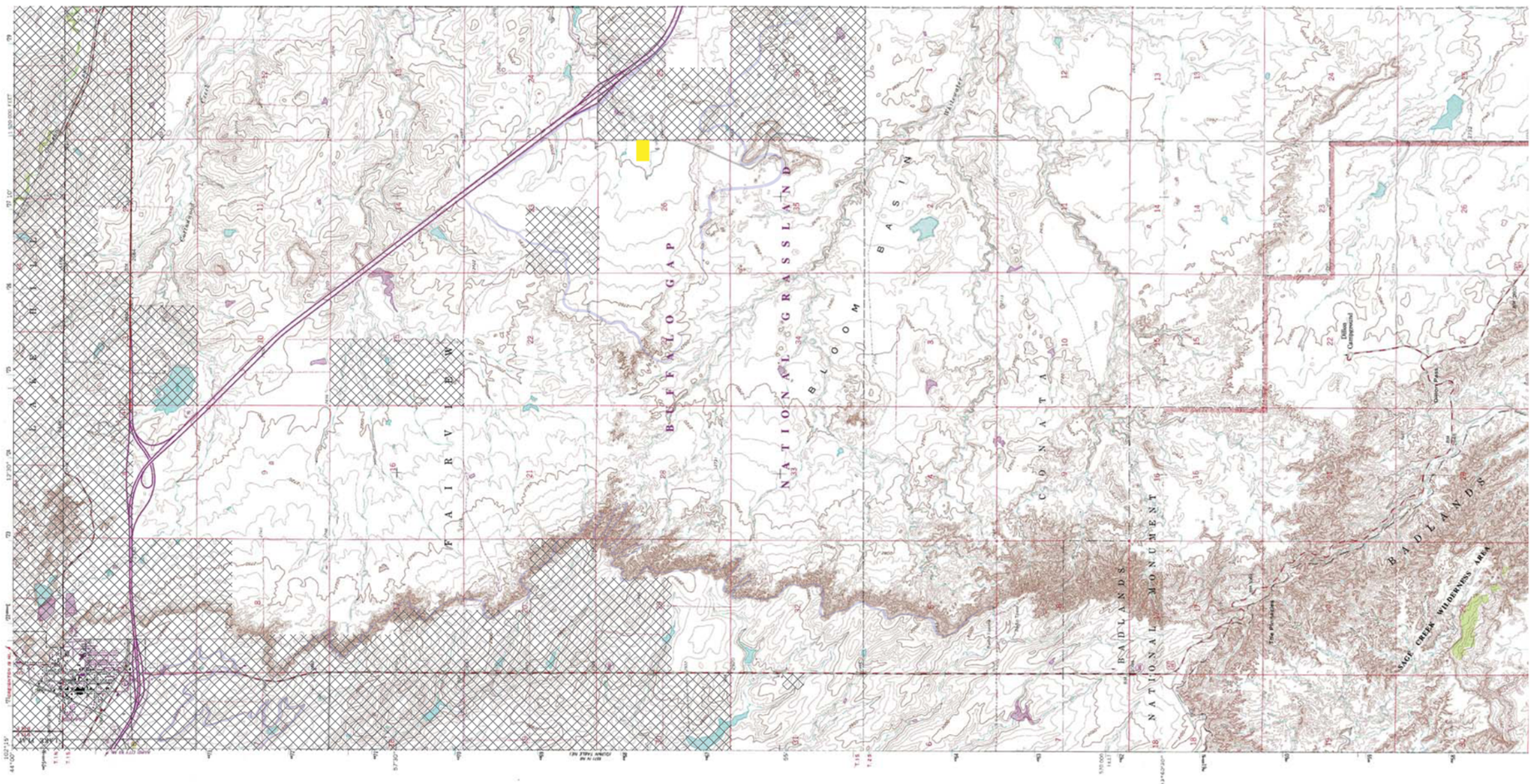
[7] *Delta-09 Cultural Landscape Inventory*, 2009, 7.

Next page:

Figure 3- 31: Delta-09 Existing Property Ownership (source: QEA September 2009).

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

DELTA-09 EXISTING OWNERSHIP



0 1000 3000 5000 7000 9000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

- Privately Owned Land
- Approximate Location of Delta-09

SOURCES

USGS MAP

QUINN EVANS | ARCHITECTS

Circulation, Delta-09

Vehicular access to the site is from Interstate Highway 90 exit 116 to Pennington County Road T512, an improved gravel road that is prone to washouts and potholes. The site access road has a gravel surface and extends to the west from County Road T512. Parking occurs on the sides of the driveway and County Road. Vehicular and pedestrian access to the facility is controlled by the security fence that surrounds the main resources. The entrance gate is locked at the end of each day and opened for pedestrian access during the park's operational hours. NPS maintenance vehicles may enter the facility as necessary through the controlled gate opening.

Once inside the fence, pedestrians are free to explore the facility. The missile launcher and viewing enclosure are the main point of interest, and most visitors move directly from the gate to the missile launcher. After observing the missile launcher, visitors look around the site and notice the other features and the surrounding landscape. Upon leaving the site, vehicles must back out of the access drive to the County Road. Frequently visitor vehicles are blocked by other vehicles, and must wait or ask other visitors to move their cars.

Topography and Views, Delta-09

The area inside the security fence at Delta-09 has been graded to form a level, earthen platform that is elevated above the surrounding terrain. The platform has a gravel surface, and was designed to provide a maneuvering platform for the truck-like transporter-erector vehicles that hauled and emplaced the Minuteman Ib and II missiles. The missile launcher and Launch Facility support building are located near the southern end of the platform.[8] The east-west oriented access drive was regraded recently, and a drain pipe was updated at the intersection of County Road T512 and the access drive. During the wet season, the southern portion of the site is inundated with water, causing erosion of the terrain on the south sides of the structures. A drainage channel lined with dense aggregate runs from the southern portion of the enclosed area, extending beyond the fence to the south. The channel then wraps around the outside of the eastern security fence to the southern side of the access road where it continues to the culvert.

The topography beyond the security fence on the west, south and east sides is relatively level grassland, allowing for far reaching views toward the badlands formations in the distance (see figure 3-32). Views to the north are also of grassland, however the elevation of the highway creates a visual edge to the views in that direction.

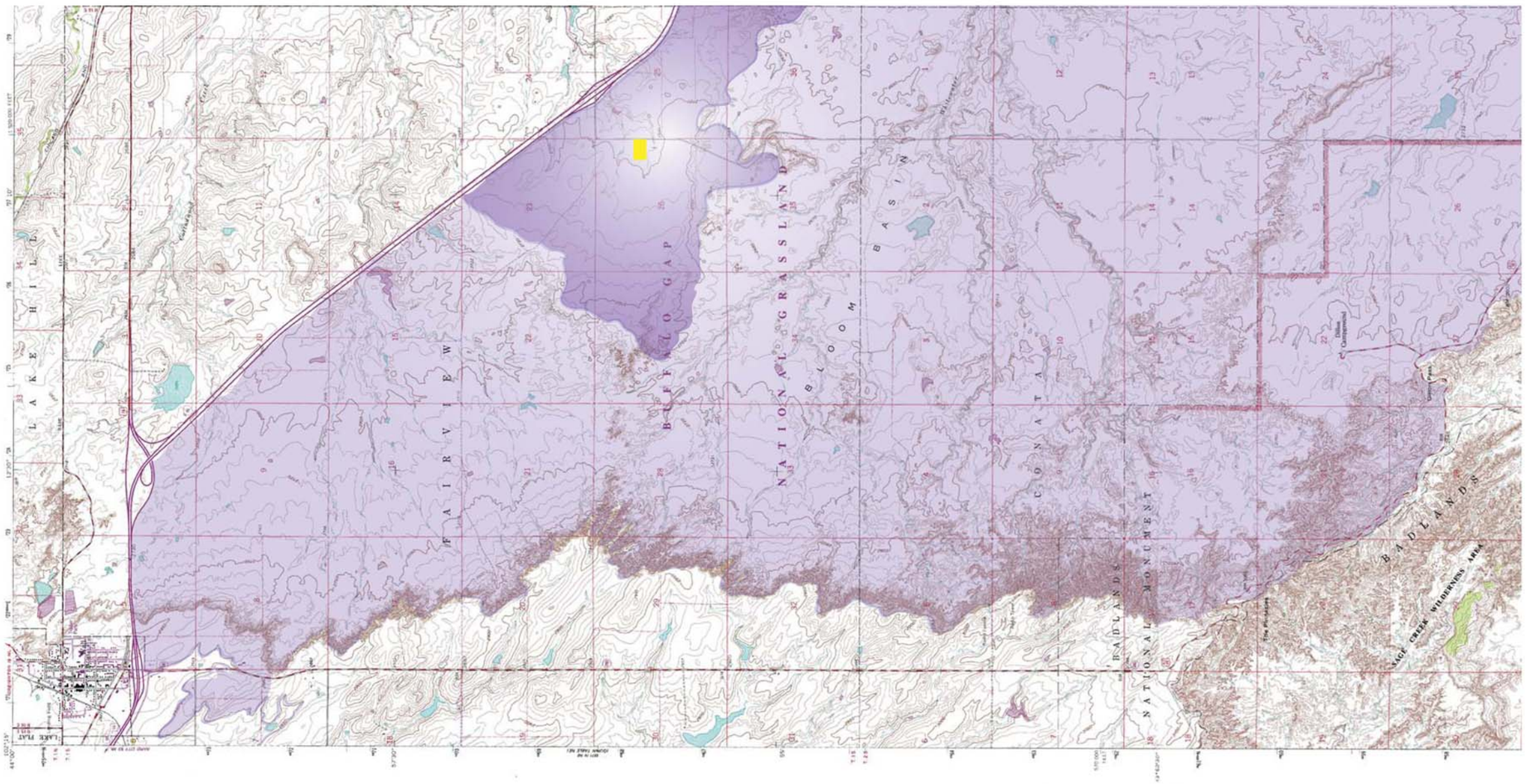
[8] Slattery, Ebeling, Pogany, and Squitieri, "The Missile Plains: Frontline of America's Cold War,"(Historic Resource Study), 87.

Next page:

Figure 3- 32: Delta-09 Existing Views (source: QEA September 2009).

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

DELTA-09 EXISTING VIEWS



0 1000 3000 5000 7000 9000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

- Delta-09 Foreground Views
- Delta-09 Background Views
- Approximate location of Delta-09

SOURCES

USGS MAP
QEA FIELD INVESTIGATIONS, JUNE 2009

QUINN EVANS | ARCHITECTS

Vegetation, Delta-09

The Delta-09 Launch Facility is situated in the northern Great Plains physiographic province, a region typified by open rolling mixed-grass prairie. The area surrounding Delta-09 includes an impoundment to the northeast along with drainages north and south of the site. A recent study identified 73 vascular plant species at Delta-09. These include graminoids such as buffalo grass (*Bouteloua dactyloides),* forbs (e.g., prairie coneflower (*Ratibida columnifera)* and slimflower scurfpea (*Psoralidium tenuiflorum),* and cacti shrubs (*Opuntia sp).*[9] Medium-height warm season grasses include western wheatgrass (*Pascopyrum smithii)* and green needlegrass (*Nassella viridula).* Short grasses such as blue gramma *(Bouteloua gracilis)* and buffalograss (*Bouteloua dactyloides)* may dominate localized areas, particularly during times of stress. Throughout the region shrubs and trees are generally restricted to draws, gullies, and surface waters.

No shrubs of any size are noticeable at Delta-09. When the Launch Facility was an active military site, the U.S. Air Force kept the maneuvering area and much of the rest of the space inside the security fencing clear of all vegetation through applications of herbicides.

Buildings and Structures, Delta-09

The primary structures at Delta-09 are the Missile Launcher (HS 901, IDLCS 100488) and the Launch Facility Support Building (HS 902, IDLCS 100490). The Architectural, Structural and Cathodic Protection Existing Conditions sections of this chapter provides detailed information about the building conditions.

[9] U. S. Department of the Interior, National Park Service, Natural Resource Program Center, Wilson, Gitzen, and Bynum, *Vertebrate and Floristic Inventories at Minuteman Missile National Historic Site: 2007 Status Report*, September 2008.

Small Scale Features, Delta-09

Table 3-2: Delta-09 Small Scale Landscape Features

Small Scale Features	Description/Condition	Figure #
Glass viewing enclosure	*A glass and aluminum viewing enclosure installed over the opening of the missile launcher in 2001. The enclosure is in good condition.*	**3-33, 3-34**
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	*White fiberglass monopole that rises from the base of the roof slab on the east side of the closure door opening of the missile launcher. Installed 1989. Microprocessor-based surveillance system designed to detect outer zone intruders. The antenna is in good condition. (verify)*	**3-34**
Hardened UHF antenna (HS 904, IDLCS 100491)	*Installed circa 1968 to link the Launch Facility with the SAC's airborne launch control center. It is located a few feet to the northwest of the silo opening and rests atop a thirteen-foot-diameter, reinforced-concrete base, shaped like an inverted saucer. The antenna is housed inside a cast-steel frustum capped with a conical, gray fiberglass weather dome. The antenna is in good condition. (verify)*	**3-33**
Cathodic protection rectifier (HS 912, IDLCS 390310)	*Installed 1982-83. Located on the south side of the access drive, approximately 160 feet east of the security fence. The below ground portion consists of a well approximately 220 feet deep that contains eleven graphite anodes. The system is not operational. It is in poor condition.*	**3-35**
Two azimuth markers (HS 905, IDLCS 100492)	*Used in conjunction with the autocollimator to align the Minuteman guidance system. They are located approximately one thousand feet from the launcher—one to the north-northwest and one to the north-northeast. Each marker consists of a cylindrical concrete pylon, three feet in diameter and eight feet deep, set vertically into the ground. The visible (above-ground) portion of each pylon is approximately eighteen inches in diameter and four feet high. A disc-shaped aluminum alloy survey plate is set into the top of each pylon. The azimuth markers are in good condition.*	**3-36**
Two HICS marker posts (HS 907, IDLCS 345796)	*Located to the south of the security fence. The wooden posts are about twelve feet tall with orange bands around the top and directional arrows to mark the location of the underground HICS. The marker posts weathered and are in fair condition.*	**3-37**
Security fence (HS 906, IDLCS 295903)	*Eight-foot high chain link security fence topped with barbed wire. The fence is in good condition.*	**3-37, 3-38**

Small Scale Features, cont.	Description/Condition	Figure #
Light posts (HS 908, IDLCS 354853)	*Two floodlights atop wooden utility poles provided illumination for nighttime maintenance activities at the site. The light posts are in good condition.*	**3-38, 3-39**
Bollard (HS 909, IDLCS 354859)	*Wood post painted yellow, approximately three feet tall. The bollards are in good condition.*	**3-38, 3-39**
Helipad & Markers (HS 910, IDLCS 354855)	*Level, square, raised gravel platform on north side of area enclosed by security fence with four small concrete cones painted yellow, one at each corner of the helipad. The helipad is in good condition.*	**3-39, 3-40**
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	*Raised gravel road bed and elevated gravel platform designed to provide space for the truck-like transporter-erector vehicles to maneuver. The gravel surface is loose and plants are encroaching in some areas. It is in fair condition.*	**3-41**
Antenna piers (HS 913, IDLCS 400831)	*Two remnants of the concrete-based pad from early outer zone security system antennas. One is a square concrete pad with four reflector mount pedestals located sowthwest of the missile launcher. The other is a clutter monument and footing of the antenna pedestal located to the south of the launch support building. The antenna piers are in good condition, although the antenna is no longer operational.*	
Transporter erector pylons (HS 914, IDLCS 412538)	*Six steel elements located on the north side of the missile launcher at the four corners of a rectangular concrete pad used by the transporter-erector vehicles. The pylons are in poor condition.*	**3-42**
Launch facility warning signs (HS 915, IDLCS 754362)	*Metal signs mounted to the outside of the security fence. The signs are in good condition.*	
Culvert	*Metal culvert at the intersection of the access drive and County Road T512. The culvert is in good condition.*	**3-41**
Drainage ditch	*Ditch along the southern side of the access road, continuing along the southern side of the eastern security fence, and approximately half-way along the eastern side of the southern security fence. The ditch was regraded and lined with dense gravel in 2006. It is in good condition.*	**3-41**
Portable toilet	*A portable toilet structure is located at the northwestern corner of the site within the security fence. The structure was placed by the National Park Service. The portable toilet is in good condition.*	**3-39**

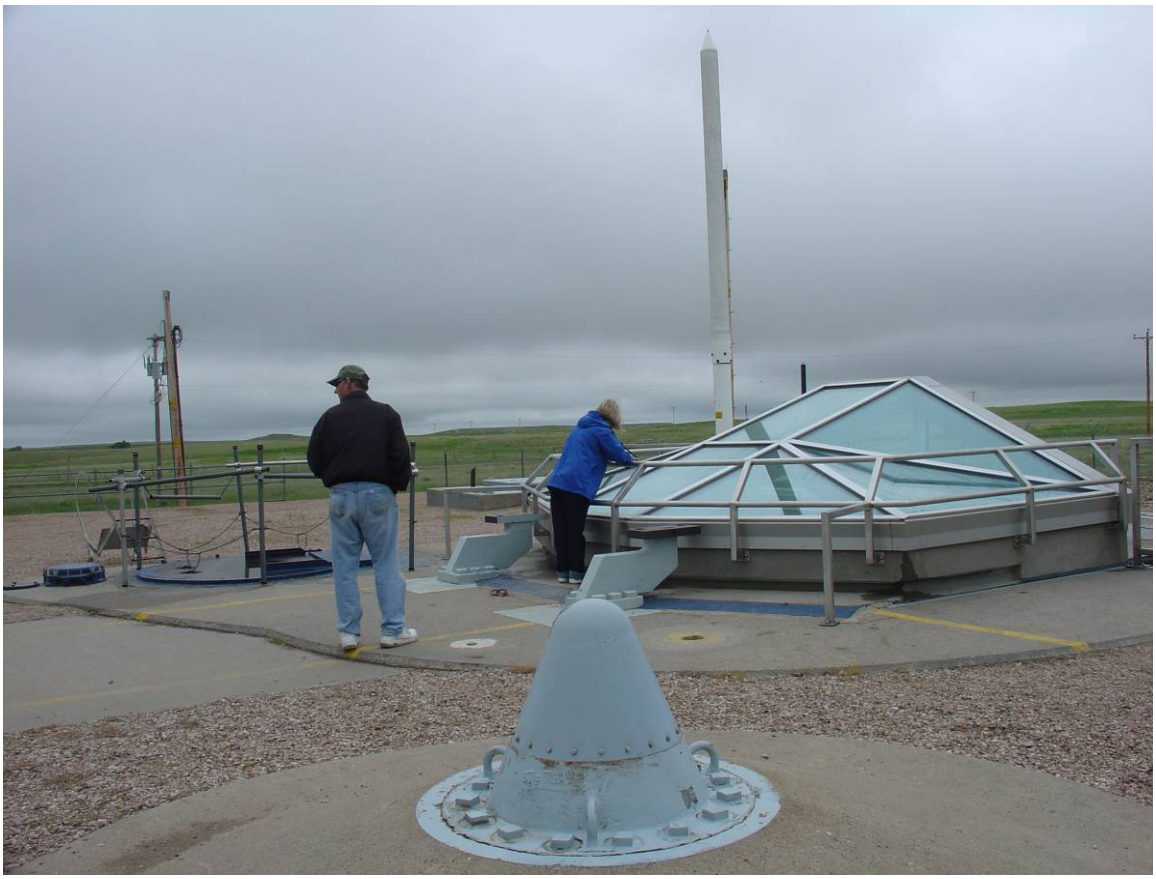


Figure 3- 33: Missile Launcher viewing enclosure with the hardened UHF antenna in the foreground, facing southeast, June 2009 (source: QEA 3578)



Figure 3- 34: Missile Launcher, facing north, the IMPSS antenna is the tall structure on the right of the viewing enclosure, the post on the left is a light post, June 2009 (source: QEA 3549)



Figure 3- 35: Cathodic protection rectifier, facing southeast, June 2009 (source: QEA 3521)



Figure 3- 36: Azimuth marker at Delta-09 with badlands formations in the background, June 2009 (source: QEA 3144)



Figure 3- 37: HICS marker post, with security fence in foreground and utility pole and ranch fence in background, facing south, June 2009 (source: QEA 3572)



Figure 3- 38: Wood bollard and lower portion of light post, with security fence and portable toilet in the background, facing northwest, June 2009 (source: QEA 3582)



Figure 3- 39: **Helipad, facing northeast, June 2009** (source: QEA 3574)



Figure 3- 40: Helipad marker, June 2009 (source: QEA 3584)



Figure 3- 41: Access drive at Delta-09, facing west, June 2009. Culvert under drive in foreground, cathodic protection device in middle, and gravel ditch to the left of the image. (source: QEA 3115)



Figure 3- 42: Transporter erector pylons, facing southwest, June 2009 (source: QEA 3592)



Figure 3- 43: Launch Facility Support Building, facing southwest, June 2009 (source: QEA 3536)

Views to other Missile Sites

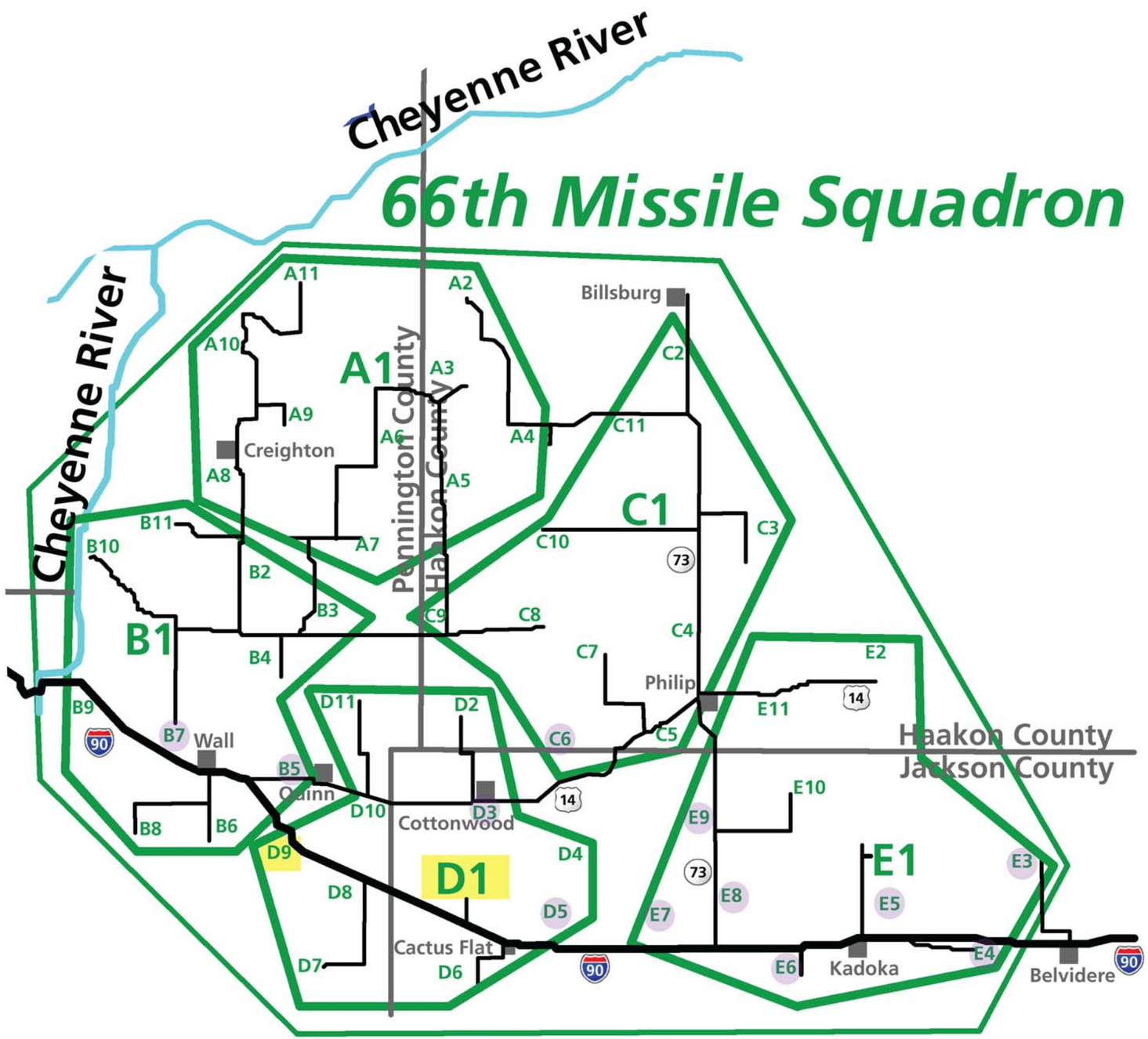
As indicated earlier, the Delta-01 and -09 facilities were part of the 66th Missile Squadron that included five launch control facilities and fifty launch facilities (see figure 3-2). The 66th Missile Squadron was one of three squadrons that made up the 44th Missile Wing in South Dakota (see figure 3-1). The facilities preserved at Delta-01 and -09 are representative of the extent of the Minuteman Missile programs. From a landscape perspective, part of the story is the quantity of missile sites that were present across the landscape of the Great Plains for over thirty years. Although the other Minuteman

facilities have been deactivated and the majority of their physical aspects have been erased from the landscape, hints of their previous existence remain.

When the sites were deactivated and the silos were imploded, the land was sold back to ranchers. The private owners may use the land as they see fit, with the stipulation that they may not disturb the ground beyond two feet from the surface. Each of the facilities had security fences similar to those at Delta-01 and -09. These fences extend above and below ground to a depth of eight feet. Therefore, the owners may not remove the security fences. In the locations of Minuteman sites, chain link fences are extant and can be viewed on the landscape. Some ranchers are utilizing the fences to store hay or farm equipment. Figure 3-44 illustrates the Minuteman sites that are visible from the highway between Delta-01 and -09.

Next page: Figure 3- 44: Former Minuteman Missile Sites Visible from the Highway, June 2009

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA



FORMER SITES EXISTING VIEWS

NORTH

Former Minuteman Missile Sites that can be seen from the road.

Delta-01 and Delta-09

Former missile sites visible from I-90 Eastbound:
- Delta-01
- Echo-06
- Echo-05
- Echo-04

Former missile sites visible from I-90 Westbound:
- Echo-05
- Delta-01
- Delta-05
- Delta-09
- Bravo-07

Former missile sites visible from Hwy 73, Northbound:
- Echo-08
- Echo-09

Former missile sites visible from Hwy 14, Westbound:
- Charlie-06
- Delta-03
- Bravo-05

Former missile sites visible from access road South of I-90:
- Echo-07

SOURCES

Minuteman Missile National Park
QEA field investigations, June 2009

QUINN EVANS | ARCHITECTS

Existing Conditions: Architecture

Delta-01 Launch Control Support Building

The one-story ranch-style Launch Control support building is in good condition due to the maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service and the exterior and interior upgrades received in the mid-1980s. This analysis will address both exterior and interior materials, as well as building systems, as they existed during physical inspections that took place in 2008 and 2009.

Analysis of the nature and color of the paint finishes on the exterior and selected interior rooms of the Launch Control support building that are associated with the initial construction, the 1973 conversion to the Minuteman II, and the most recent paint colors that were applied prior to the transfer of the site to the National Park Service was undertaken. The findings of this investigation are provided in Appendix A: Paint Analysis.

The following definitions are utilized in the conditions assessment:[10]

Good: No visible damage; requires only standard maintenance.
Fair: Minor visible damage; may require repair.
Poor: Visible damage that affects the physical integrity of the element; may require repair or replacement of the element.

Exterior Envelope, Delta-01 Launch Control Support Building

Foundation: The 8 inch thick reinforced concrete foundation wall is in good condition with a couple areas of minor blemishes along the north and south elevations. The grade, especially along the south elevation, slopes towards the foundation wall allowing water to pond against the surface (figure 3-46). The presence of water and ice standing against the concrete foundation can, over time, deteriorate the concrete and negatively affect the structural steel rebar encased in the concrete as well as causing deterioration of the wood wall structure. The face of the wall is painted a dark chocolate brown, except below the door sills where it is painted off-white. The paint is in good condition.

[10] Definitions established by Quinn Evans Architects.



Figure 3- 45: Delta-01 Launch Control Support Building (source: QEA 8394)



Figure 3- 46: Ponding at south elevation foundation wall (source: QEA 0008)



Figure 3- 47: North elevation looking west (source: QEA 0041)

Siding: The pre-finished tan colored, wood grain embossed, prefabricated steel siding (8" exposure), which replaced the original asbestos cement shingle siding in the mid-80s, is in good condition with several dings, gouges, and dents throughout the four elevations (figures 3-45, 3-47, 3-48, 3-49). There is some staining below the hose bib on the south elevation caused by dripping water from the bib. The exterior and interior corner trim and window surrounds are also in good condition. There are no indications that the siding is not functioning as expected for its age and condition.

Copper condensate pipes protrude through the steel siding along the north and south elevations high on the wall and are routed down to grade to discharge the condensate water. These are located in conjunction with the fan coil units installed on the interior circa 1986. The lines are in good condition.

There are black metal brackets attached to the steel siding at various points on the north, south and east elevations that are remnants of an earlier security and

intrusion system that was removed. This security system was installed by USAF and NPS during the transfer period for the museum.

There are various other elements on the field of the metal siding on each elevation and are itemized as follows:

South Elevation:

- A dual-headed weatherproof electrical connection exists adjacent to door #2 at the generator room and is in good condition, although it is unknown if they still work.
- Security lights at each corner of the building, paired at the southeast and southwest corners and single at the northeast and northwest and a single over door #13, are in good condition. The NPS has paperwork submitted to replace selected exposed wiring.
- Exterior caged light fixtures at doors #9, 13, 14, and 17 are in good condition.
- Speaker adjacent to door #13 is damaged and may not function, as this was part of the removed intrusion system.
- Hood over door #13 at the pressure relief damper is painted (trim color dark brown) metal and in good condition.
- Hood east of door #17 at the fresh air intake grille is painted (trim color dark brown) metal and in good condition.
- There are two low louvers adjacent to doors 17 and 13 that show on the original drawings that are no longer extant on the building. It is likely they were removed or covered during the installation of the steel siding.
- The fire suppression system Siamese connection between door #14 and #17 installed in 1999/2000 is in good condition.
- Honeywell ambient temperature sensors for the boiler and chiller are mounted near door #17 high on the wall and are in good condition.
- Small steel tubing protruding above and west of door #17 is a vent tube for the propane tank servicing the boiler and was installed in 2000 by the NPS.

West Elevation

- Miscellaneous horizontal and vertical metal conduit, both painted and un-painted, are in good condition.
- There is one location in the south half of the gable where a previous penetration of electrical wire through the siding has been abandoned.
- The metal louver at the top of the gable is painted the dark brown trim color and is in good condition.



Figure 3- 48: Launch Control Support Building, west elevation (source: QEA 0018)

North Elevation

- The women's toilet room exhaust hood, unpainted, is in good condition.
- The electrical conduit, disconnect switch panel and propane supply pipe are in good condition.
- Two metal hoods over intake air louvers are painted the dark brown trim color and are in good condition. The air intake louver for the original brine chiller in Equipment Room #106 is lying on the floor, inside the room, below the opening. The opening has been sealed with plywood to protect the room from water infiltration. One or both of these hoods appears to have been added circa 1982; existing drawing ML-MH-005 indicates a hood being installed over the brine chiller louver.
- The original drawings show two large side by side and two small high and low air intake louvers in Equipment Room #106, only one of which is visible now.
- Between the two hoods are a piece of metal tubing and a capped off metal pipe that penetrate the siding. The pipe is an inspection test point for the sprinkler system installed in 1999 and is in good condition.
- The metal flue for the old generator penetrates the wall and turns skyward. It is painted the dark brown trim color and while in good condition needs repainted.
- At the northeast corner, a metal pipe, painted the tan wall color, runs vertically to above the line of the gutter. This pipe was the vent pipe for the diesel tank now filled in and no longer functions, but is in good condition.



Figure 3- 49: Launch Control Support Building, east elevation (source: QEA 0045)

East Elevation

- Miscellaneous metal electrical conduit, vertical and horizontal, painted and un-painted, is in good condition. One vertical conduit is painted white versus the tan siding color. The two lower horizontal conduits were used to store the dipsticks for the underground diesel tank when it was in use.
- The metal louver at the top of the gable is painted the dark brown trim color and is in good condition.

Windows: The windows are wood one-over-one double hung with vinyl cladding on the exterior installed circa 1983. Each window has a combination aluminum storm window comprising a stationary upper glass storm panel and an operable lower storm/screen panel held in place by aluminum clips with steel screws, many site-made. The windows are in fair to good condition with most having cracked vinyl at the glazing stop and some weatherization of the vinyl coating. The combination storms are in good condition. The interior face of the glass in the Men's Latrine Room #115 has a film coating which has discolored.

Doors: All exterior doors were replaced circa 1976 with hollow metal doors and frames and ¼" wire glass on doors #9, #17 & #25 (figure 3-50). NPS replaced all the door knobs and added the strike cover plates to all doors; they have the replaced hardware in storage. The attached garage door was changed to a pair of flush hollow metal doors circa 1985. All doors and hardware are in good

condition. All but two of the original ground mounted door holders are missing or damaged and the remaining two are in fair to poor condition.

- The concrete stoops at doors #9, #17, and #25 are in good condition.
- The concrete pad at door #4 slopes up from the asphalt drive to just below the threshold and is in good condition.



Figure 3- 50: Launch Control Support Building, south elevation doors (source: QEA 0012)

Gutters and Downspouts: The original gutters and downspouts were replaced circa 1983 with new aluminum gutters and downspouts along with new aluminum soffit and fascia panels and trim strips installed over the existing wood soffit and fascia boards. The gutters and downspouts were replaced again, in kind, by the NPS in 2008. Soffit and fascia panels, trim strips and gutters were pre-finished the dark brown trim color; downspouts are painted tan. All are in good condition. New concrete splash blocks were installed at the same time, painted dark brown and are in good condition.

Roof: The original roof had dark green asphalt shingles over 15 pound building felt over 1/2" plywood sheathing.. These shingles were removed and replaced, circa 1983, with Certainteed Saf-T-Lok Class C 2-tab, Timber Blend color over an additional layer of ½" plywood sheathing. The NPS removed the second roof and replaced it in-kind in 2008 with Certainteed Custom-Lok 25, Timber Blend color. The roof is in good condition.

- Miscellaneous metal vents, exhaust hoods and ventilators are all painted dark brown trim color and are in good condition.

- Wind direction indicator (no date as to original installation) is painted dark brown on the legs and yellow on the arrow and is in good condition.

Interior Finishes, Delta-01 Launch Control Support Building

General Finishes

Doors: All doors are original solid core wood doors painted and in good condition with the exception of door #12 which is a stained and varnished, hollow core wood, closet double sliding door in good condition. The matching doors on Storage Closet 109 were removed prior to1995 (1995 HAER photographs of the Day Room show them removed). Door 21 into the Security Bedroom and the adjacent hallway door have a vinyl or wood parquet pattern tile glued to the outer face of the door ¾ of the height. Door #8 also had a similar treatment on the bottom ¾ of the door removed by the National Park Service in 2004 due to the failure of the adhesive to hold the vinyl or wood in place. Interior doors #8 and the mid-corridor door have vision glass panels.

Carpet: All carpet was replaced, in kind, by the National Park Service in 2007, with the exception of the gun locker in Security Office 101, the Cook's Bedroom 106, the Day Room Storage Closet 110 and the Closet 122. During replacement, approximately 50% of the vinyl asbestos tiles and asphalt tiles were removed and not replaced due to loss of adherence to the concrete substrate.

Security Office 101

Floor: Partial original asphalt tile floor is under pad and carpet (light mauve with a dark mauve runner) installed in 2007. Carpet is in good condition.

Walls: Vinyl wood grained panel wainscot goes approximately half-way up the wall with the exception of an area above and to the east of door #7 to the corner where the paneling is full height. Paneling is in good condition. Remainder of the wall is painted drywall in good condition.

Ceiling: Suspended 2' x 2' tegular acoustic tile ceiling with surface mounted fluorescent light fixtures is in good condition. The definition of tegular or recessed T-bar ceiling is essentially a standard T-bar type ceiling construction except that each lay-in ceiling panel is kerffed or rabetted so that when installed in the T-bar frame the panel hangs below the grid.

Window Treatment: Tinted plastic transparent roller shades cover the windows from the interior and are in good condition. The corner window on the east wall is missing a roller shade and hardware.

Security Console: The extant security console was installed circa 1983 and is in good condition *(figure 3-51)*. The console was installed over the original carpet with the circa 1990 carpet scribed to the console. The original carpet remains exposed between the console and the east and south walls.

Expanded Metal Panel and Door: Expanded metal wire panel and door in the security office is in good condition. It was installed sometime between 1983 and 1999.



Figure 3- 51: Security Office looking east, 2009 (source: QEA 0117)

Entrance Shaft Vestibule 102

Floor: Steel plate floor is painted a medium-light grey and is in good condition.

Walls: Walls are painted drywall, color off-white, and in good condition.

Ceiling: Ceiling is painted drywall, color off-white, and in good condition.

Elevator: Steel frame, folding metal gate, expanded metal panels, and metal cab are all painted and in good condition. Cab interior has a carpet glued to wall panel in a wood frame on the three interior walls to a height of approximately 6 feet and is in good condition. It is unknown when this finish was installed.

Elevator Equip. Room 103

Floor: Concrete floor is painted a medium-light grey and is in good condition.

Walls: Walls are painted drywall, color off-white, and in good condition.

Ceiling: Ceiling is painted drywall, color off-white, and in good condition.

Expanded Metal Gate and Frame: Gate into the equipment room is an expanded metal gate painted off-white and is in good condition.

Recreation Room 104

The original attached garage was converted, circa 1983, into a finished recreation room.

Floor: The original concrete floor was covered with carpet during the conversion. The NPS replaced the carpet in-kind due to staining from a leak in the roof. Carpet is in good condition.

Walls: All walls are painted drywall in good condition. Four foot high vinyl, wood-grained wainscot with a wood cap molding is on each wall, and is in good condition.

Ceiling: Ceiling is painted drywall and is in good condition.

Generator Room 105

Floor: The original hardened concrete floor has been covered with vinyl asbestos tile (VAT), installation date unknown, and is in good condition. An area immediately adjacent to door #2 was damaged from a water leak and replaced by the NPS with tile matching the pattern but in a lighter color.

Walls: Walls are painted drywall and are in good condition with some wear and tear.

Ceiling: The ceiling is painted drywall and is in good condition with some isolated areas of water damage by the roof ventilator duct.

Equipment Room 106

Floor: Original hardened concrete floor has been covered in vinyl asbestos tile, installation date unknown, and is in good condition. The NPS stripped the finish

of the tile and re-waxed the floor post 2002. The floor of the Clean Room is the original hardened concrete painted and is in good condition.

Walls: Walls are painted drywall and are in good condition with some wear and tear. The NPS repainted the walls with the same color post 2002.

Ceiling: The ceiling is painted drywall and is in good condition. The NPS repainted the ceiling with the same color post 2002.

Vestibule 107

Floor: The original hardened concrete floor has been carpeted in 2007. The carpet is in good condition.

Walls: The base walls are painted drywall in good condition. A lower wood wainscot with cap and base occurs on the west wall that is similar to the wood wainscot on the west and south walls of the Dining and Recreation Room, stained slightly darker and is in good condition. The east wall of the Vestibule has vinyl wood grained hardboard paneling with cap and base that matches the typical wainscot in the building; also in good condition.

Ceiling: Suspended 2’ x 2’ tegular acoustic tile ceiling with recessed fluorescent light fixtures is in good condition.

Dining & Rec. Room 108

Floor: Partial original vinyl asbestos tile floor is under carpet and pad installed by the NPS in 2007. The light mauve color is similar to the carpet replaced and the dark mauve runner was added by the NPS to designate a route for visitors. Carpet is in good condition.

Walls: Base walls are painted drywall in good condition; some areas along the south wall have been previously wallpapered and painted over.

- East wall has full height wood paneling from the southeast corner to just behind the entertainment console. The paneling has no base or cap and is in good condition. A large wood framed woodland mural is mounted under the paneling (figure 3-52).
- The northeast corner has a large wood corner entertainment console that is in good condition.
- The north wall has the typical vinyl wood grained wainscot with a vinyl cap in good condition.
- The northwest corner has a built-in base cabinet with countertop and a smaller wall cabinet above in good condition. A refrigerator sits next to the base unit to the east.

- The west wall has a lower height wood wainscot with cap and base, stained, in good condition (figure 3-53).
- The south wall has the same stained wood wainscot found on the west wall that terminates at the Storage Closet and is in good condition.

Ceiling: Suspended 2' x 2' tegular acoustic tile ceiling with recessed fluorescent light fixtures in good condition.

Window Treatment: The windows on the north wall are covered with vinyl vertical blinds with matching valance in good condition.



Figure 3- 52: Dining and Rec Room 108, looking east (source: QEA 0080)



Figure 3- 53: Dining and Rec Room 108, looking west (source: QEA 0084)

Storage Closet 109

Storage Closet 109 has been converted, prior to 1995, to a vending alcove off the Recreation room. Conversion date is unknown; however, the 1995 HAER interior photographs indicate the doors removed and oral traditions, yet to be transcribed, indicate a Coke machine was in the west end of this converted area.

Floor: Carpet, installed in 2007, is in good condition.

Walls: Base walls are painted drywall in good condition but visually rough at a level above the door opening. The standard vinyl wood grained wainscot with cap and base are on the east, south and west walls and is in good condition.

Ceiling: The painted drywall in good condition.

Storage Closet 110

Floor: Carpet, circa 1983, over the original vinyl asbestos tile on the front half, with the tile creating a riser towards the back half. Both materials are in fair condition with some staining on the carpet and scuff marks on the tile.

Walls: Painted drywall in good condition.

Ceiling: Painted drywall in good condition.

Shelves: Painted wood shelves in good condition.

Telephone Equipment Room 111

Floor: The original hardened concrete has been covered with vinyl asbestos tile, installation date unknown, and is in good condition.

Walls: Walls are painted drywall with a 3'- 4" high hardboard wainscot painted and are in good condition with some wear and tear.

Ceiling: The ceiling is painted drywall and is in good condition.

Water Treatment Room 112

Floor: The original hardened concrete has been covered with vinyl asbestos tile, installation date unknown, and is in good condition.

Walls: Walls are painted drywall with a 3'- 4" high hardboard wainscot painted and are in good condition with some wear and tear.

Ceiling: The ceiling is painted drywall and is in good condition.

Utility Room 113

Floor: The original hardened concrete has been covered with vinyl asbestos tile, installation date unknown, and is in good condition.

Walls: Walls are painted drywall with a 3'- 4" high hardboard wainscot painted and are in good condition with some wear and tear.

Ceiling: The ceiling is painted drywall and is in good condition.

Kitchen 114

Floor: vinyl asbestos tile, color grey marbleized, installation date unknown, is in good condition.

Walls: Base walls are painted drywall in good condition. Covering the drywall is partial height prefinished hardboard paneling, painted white, with rubber base in good condition.

Ceiling: The ceiling is painted drywall and is in good condition.

Cabinets: Various kitchen cabinets were replaced circa 1976, 1980 and 1983 with the metal cabinets that presumably are extant today (figure 3-56). Cabinets are orange and in good condition. "Midway Units" cabinets with sliding glass doors were added under the upper wall cabinets on the south wall circa 1983 and are in good condition.

Countertops: Original stainless steel counters and integral backsplash were replaced circa 1983 along with the double bowl sink at the north wall; all are in good condition. The double bowl sink on the south wall was removed during the circa 1983 remodeling.

Pass-Thru Window: The pass-thru window received a new stainless steel frame circa 1983 and is in good condition (figure 3-55).

Kitchen Equipment:

- The exhaust hood, base cabinets, food warmer, and griddle all appear to be original equipment and in good condition (figure 3-57).
- The original range (4 burner) with oven appears to have been replaced with a commercial oven unit, between 1980 and 1983, which is in good condition.
- The original deep fat fryer appears to have been replaced with a two burner cook top unit, between 1980 and 1983, which is in good condition.
- Refrigerator, unknown date, is in good condition.
- Dishwasher: The original dishwasher was relocated on the north wall to the east, circa 1980, and is in good condition (figure 3-54). It is unknown if this unit is still the original.



Figure 3- 54: Kitchen, looking north (source: QEA 0012)



Figure 3- 55: Kitchen serving and pass-thru, looking southwest (source: QEA 0078)



Figure 3- 56: Kitchen cabinets, looking south (source: QEA 0074)



Figure 3- 57: Kitchen stove, looking southwest (source: QEA 0071)

Serving 114A

Floor: vinyl asbestos tile, color grey marbleized, installation date unknown, is in good condition.

Walls: Base walls are painted drywall with rubber base in good condition. Covering the drywall is partial height vinyl wood grained hardboard paneling on the north and west wall in good condition. The paneling on the west wall has a tall, black, solid material base with the rubber base attached to it; all in good condition. The south and east wall of this room were reconstructed circa 1985.

Ceiling: Suspended 2' x 2' tegular acoustic tile ceiling with recessed fluorescent light fixtures in good condition.

Kitchen Equipment:

- Two stand alone upright freezers are against the north wall, one relocated from the kitchen; both in good condition.
- A three unit commercial freezer unit stands along the east wall and is in good condition (figure 3-59).



Figure 3-58: Commercial freezer unit on east wall of serving room (source: QEA 0077)

Men's Latrine 115

Floor: The original vinyl asbestos tile was replaced with ceramic tile, circa 1980, and is in good condition. Colors are Cocoa Brown for the field and Reef Brown for the 12" wide accent band.

Walls: The original base wall is painted drywall and is in good condition. The original prefinished hardboard panels and rubber base were replaced with ceramic tile wainscot, 4'-0" high, circa 1980, and is in good condition. Color of the wall tile is Reef Brown.

Ceiling: The original drywall ceiling is painted and in good condition.

Bathroom Accessories:

- The original wall mounted porcelain sinks were replaced with cast iron single bowls with a porcelain finish set in a new plastic laminate countertop and backsplash, circa 1980; all in good condition.
- A new plastic laminate shelf was installed above the counter, circa 1980, and is in good condition.
- The original three individual light fixtures above the sinks were replaced, circa 1980, with a continuous bar light and is in good condition.
- Original paper towel dispenser was replaced, circa 1980, with a new towel dispenser and trash receptor and is in good condition.
- All original metal toilet & urinal partitions and dressing compartments, and prefabricated shower stalls were replaced, circa 1980, with new metal partitions (Knicker Bocker Co.) and prefabricated shower stalls. The shower stalls and metal dressing compartments partitions (Knicker Bocker Co.) were replaced again, circa 1983, when the supporting walls were reconstructed. Associated shelves and benches were re-installed during the last episode. All are in good condition.

Women's Latrine 116A

The women's latrine was installed circa 1985/86.

Floor: 1" x 1" ceramic tile in good condition.

Walls: Base walls are painted drywall in good condition. A 4 ¼" x 4 ¼" ceramic tile wainscot is on each wall to a height of 4'-4 ¼" and is in good condition.

Ceiling: Painted drywall in good condition.

Bathroom Accessories

- Lavatory: Plastic laminate lavatory counter, backsplash, leg, and porcelain sink are all in good condition.

- Prefabricated vinyl plastic shower stall is in good condition except for a hole in the floor.
- Mirror, over mirror light fixture, wall mounted soap dispenser, and wall mounted paper towel and toilet paper dispenser all are in good condition.

Bedroom 116

Floor: The circa 1983 carpet was removed to route new plumbing lines below the concrete slab and construct the Women's Latrine. New carpet was installed after the work and is in good condition.

Walls: Base walls are painted drywall in good condition. The north wall has a partial height vinyl wood grained hardboard wainscot from corner to corner in good condition. The east and south wall of the room and the walls adjacent to the Women's Latrine are covered in fabric covered acoustic panels from floor to ceiling and are in good condition.

Ceiling: Suspended 2' x 2' tegular acoustic tile ceiling with recessed fluorescent light fixtures in good condition.

Typical Bedroom (Rooms 117, 118, 119, 120, 123, & 124)

Floor: All bedrooms had the circa 1983 carpet replaced with reproduction carpet in 2007-2008, installed over the original asphalt tile (figure 3-59). All carpets are in good condition. In Room 124, the carpet had been removed for replacement exposing the original tile pattern. There is a 4" dark brown or burgundy border tile that only occurs at the exterior wall (both north and west wall in this room). Next to that is a 9" x 9" tile border of light beige and then the field tile of grey or dark beige (it is difficult to tell the color). All tiles are the marbleized pattern and have carpet adhesive coating the entire floor. Reproduction carpet now covers the original tile in Room 124.

Walls: Base walls are painted drywall in good condition. The exterior wall of each room has the partial height vinyl wood grained hardboard wainscot from corner to corner in good condition (figure 3-60). The corridor walls and walls adjoining the Men's Latrine have the fabric covered acoustic panels from floor to ceiling in good condition.

Ceilings: Suspended 2' x 2' tegular acoustic tile ceiling with recessed fluorescent light fixtures in good condition.

Window Treatments: Vertical fabric curtains on a retractable rod in good condition. Window glass in Bedrooms 118 and 120 has been painted black.



Figure 3- 59: Typical bedroom (118) looking northwest (source: QEA 0063)



Figure 3- 60: Typical bedroom (123) looking south (source: QEA 0058)

Corridor 121

Floor: Partial original asphalt tile floor is under pad and carpet installed by NPS in 2007. The dark mauve color was added by the NPS to designate a route for visitors. Carpet is in good condition.

Walls: Original base wall is painted drywall. Vinyl wall fabric was installed on the drywall prior to 1985 and then subsequently painted. Walls are in good condition. The lower parts of the walls have the partial height vinyl wood grained hardboard wainscot with wood cap and base in good condition. The drinking fountain alcove has dark brown, fabric weave pattern, wall covering on three sides, in good condition.

Ceiling: Suspended 2’ x 2’ tegular acoustic tile ceiling with recessed fluorescent light fixtures in good condition (figure 3-61).

Linen Closet 122

Floor: Blue carpet, installation date unknown, over original asphalt tile, both in good condition.

Walls: Painted drywall in good condition.

Ceiling: Painted drywall in good condition.

Shelves: Painted wood shelves in good condition.



F**igure 3- 61: Corridor, looking west** (source: QEA 0012)

Launch Control Center

Vestibule B-1

Floor: Original concrete, painted, in fair condition with moderate wear of the painted surface.

Walls: Original concrete, painted, in good condition with moderate wear of the painted surface. See Part 1-A Historical Background for discussion on decorative paintings in this area.

Ceiling: Original concrete, painted in good condition.

Blast Door and Door Stop: The original 8-ton, blast-proof, steel and concrete door is painted light grey and in good condition (figure 3-62 and 3-63). See Part 1-A Historical Background for discussion on decorative paintings on the face of this door. The steel door stop is bolted to the concrete wall 3'-5" high to the center and painted bright yellow with a rubber or neoprene bumper pad attached to the end. The door stop is in good condition.



Figure 3- 62: LCC Vestibule, blast door (source: QEA 7015)



Figure 3- 63: Launch control center vestibule artwork (source: QEA 7017)

Shell: The original interior concrete surface and steel interior liner are painted and are in good condition. Additional elements within the capsule are as follows:

- Emergency escape tube steel cover is painted red and is in good condition along with the associated linked chains attached to it.
- The structural steel floor support, floor plate, and permanent shoring devices are painted and in good condition.
- Stainless steel handrails, added by the National Park Service for safety, are in good condition.
- Shock isolators (4) are painted white and are in good condition.
- Chilled water tank on north wall is galvanized steel and is in good condition.
- Cable protective frame enclosure on south wall is galvanized steel and is in good condition.
- Exterior surface of the Launch Control Center is galvanized steel and is in good condition.
- Insulated electrical cables are in good condition. NPS reported that a whitish growth had attached itself to the cable covering, had the growth tested and determined that it is not harmful to the cable.
- Miscellaneous equipment boxes, conduit, piping, handholds and footholds, etc., all appear to be in good condition.

Floors: Carpet, installed with a reproduction of the prior carpet in 2007 by NPS, is in good condition. Original documents called for vinyl sheet floor covering over the steel plates. 1982 photographs do not appear to show carpet on the floor. 1990 photographs show carpeting of a beige/gold color with a beige/gold vinyl tile between the rails of the sliding chair.

Walls: Solid and perforated metal acoustic panels, painted, in good condition. Sound absorption fabric panels were installed between 1982 and 1990 on the walls and ceiling to deaden the noise in the Center (figures 3-64 and 3-65). These beige colored panels are in good condition with the exception that the hook and loop fasteners are coming loose from the racks due to the contact cement releasing from the attachment point.

Ceiling: Acoustic fabric over perforated metal acoustic panels, painted, in good condition.

Equipment:

- Latrine unit was changed out circa 1988 and is in good condition.
- Modular bed storage unit assembly was installed circa 1990 and is in good condition.
- All other fixed equipment including desks, chairs, and electronics are all in good condition.



Figure 3- 64: Launch Control Center, looking west (source: QEA 0110)



Figure 3- 65: Launch Control Center, looking east (source: QEA 0113)

Life Safety and Accessibility

A conceptual-level assessment of the Delta-01 Launch Control and Support Facility with respect to barrier-free accessibility and life-safety issues has been conducted, see Appendix B. This analysis was based on Chapters 3 through 10 of the 2006 International Building Code (IBC) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The project was not reviewed under the International Existing Building Code or under Chapter 34 of IBC.

The Delta-01 site consists of a one-story, ranch-style structure containing living quarters for the personnel at the site, a security office, and associated utility and support requirements. The structure is wood, platform framed, with a concrete foundation, qualifying as Type IIIB. The main floor is about 5,080 square feet. Constructed beneath this structure is an underground concrete capsule containing the missile launch control facility. This underground capsule is accessed via an open elevator hoistway. Additionally, there are a number of communications structures on site and a detached heated vehicle storage facility. The vehicle storage facility and communications structures were not evaluated as part of this assessment.

The facility was de-commissioned by treaty and is now administered by the National Park Service as a historic site. Public access to the site is currently limited to three groups of six individuals, escorted by ranger guides. While one group tours the above-ground launch support building, a second group tours the site, while the third group is escorted through the underground launch control facility. Permanent restroom facilities in the launch support building are not used. Temporary toilet facilities are available on site, and a comfort station near the site is contemplated by the NPS to provide permanent barrier-free restroom facilities for the site.

Barrier-Free Issues: The launch support facility is a former military installation and it was not designed to accommodate universal accessibility. Despite this, the building has few accessibility issues, owing mainly to the facts that it is a single story structure and that the existing restroom facilities within the structure are not available for public use. The two most significant barrier-free issues identified at the site are (1) the lack of barrier-free on-grade entrances and (2) the presence of narrow door openings in the building, which present obstacles to an accessible route through the building. Additionally, the elevator to the Launch Control Center is not adequately sized to meet current barrier-free design requirements.

Although the building is a one-story structure, the finish floor is a few inches above grade. Although there is a sloped grade up to the utility area doors adjacent to the elevator lobby entrance (Door 4) this grade still does not provide suitable barrier-free access.

There is adequate width at the exterior entry doors and most interior doors along circulation paths. Doors to the dormitory and security office spaces within the building, according to USAF as-built drawings, are 32 inches in width, equating to an approximately 30 inch clear swing. Existing latrine doors are indicated to be 30 inches

wide. The security office doors, which are the only available interior connection between the living quarters and the elevator lobby for the capsule, present an issue for the accessible route through the building. Approach clearances at doors vary throughout the building. Latch-side clearances are not always available, but maneuvering clearances are available.

A minimum clear swing of 32 inches is required for doors by ADAAG. In practical terms, a 36-inch door is required to provide this minimum opening. However, the fact that public access is limited to small, escorted groups provides the opportunity for the escorting ranger to provide assistance to visitors in wheelchairs, for whom the width requirements are intended. Doors along the accessible route are not so narrow as to preclude wheelchair passage altogether, therefore a reasonable accommodation can be made for these visitors by providing assistance through the door opening. If self-guided tours were ever implemented for this facility, the narrow doors along the accessible route would need to be replaced with 36-inch doors of the same design and materials, to accommodate wheelchair users. An alternative to this approach is to remove the 32" door and door stops providing the 32" minimum clearance at the doors to the dormitory and security office. A second option is to provide a narrower Park-owned wheel chair offered to the visitor as a choice.

Access to the Launch Control Center is provided by an elevator. The only alternative means of egress from the underground center is a ladder. National Park Service safety requirements include asking all visitors if they are physically able to climb a thirty-one foot ladder in the event an emergency. Visitors who cannot do so are not allowed to descend into the Launch Control Center. While it is unlikely that many visitors in wheelchairs could meet this requirement, it is possible and the park would like to keep the option available. For visitors who cannot meet the requirements to visit the Launch Control Center, NPS will need to provide an alternative approach to interpreting the Launch Control Center.

The existing elevator to the Launch Control Center is very small, and its use as a barrier-free means of access is consequently limited. The elevator cab measures approximately three feet by five feet. As a result, an individual in a wheelchair will take up most of the space within the elevator. The location of the elevator within the structure, and its servicing of an underground structure, precludes the possibility of alteration of the hoistway. Therefore it is neither practical nor technically feasible to provide a larger elevator car. It should be possible for a wheelchair user to maneuver into the car, and an accompanying ranger can operate the elevator controls, so it is possible to accommodate wheelchair users with this elevator. However, it is unlikely that a wheelchair user can share this car with more than two or three standing individuals, due to the space limits in the car, and this operational issue will need to be addressed by the NPS.

Life-Safety Issues: Exit access, capacity and remoteness in the above-ground facility meet or exceed the requirements of IBC, with three available exits remotely located. The facility is fully-sprinklered and equipped with smoke detectors. Height and area requirements fall well within parameters established by IBC for the construction type (IIIB) of the building.

The real challenge to life-safety compliance at this facility is the Launch Control Center. A confined underground space, this chamber is accessible only by means of the elevator, which is served by an open hoistway. An emergency escape ladder is adjacent to the hoistway, which leads up to the ground-level elevator lobby. Typically, ladders such as these are not considered a valid means of egress. Open elevator hoistways connecting different floors of a building are not permitted under the current IBC. In this case, the elevator lobby is fully enclosed and provided with a direct means of egress (via Door 4), which mitigates some of the life-safety risk from the interconnection created by the open hoistway.

Under Chapter 4 of IBC 2006, it appears that the Launch Control Center qualifies as both an underground building (Section 405) and as a Special Amusement Building (Section 411). Under Section 405, the Capsule appears to comply with exceptions due to its size, occupant capacity and distance below grade, and therefore the special rules of Section 405 do not apply. As a Special Amusement Building, the capsule is required to have automatic fire detection, sprinklers, marked paths to exits, an emergency voice communications system, and Class A interior finishes. Fire detection systems and sprinklers have been installed in the capsule. However, the emergency voice communication system is not installed. As the facility is relatively small, the issue with egress deals not so much with the path to the exit not being clear, so much as the means of egress itself being not readily available. Interior finishes generally consist of painted metals and concrete. It is unknown whether the historic acoustical fabric ceiling panels installed in the control center are treated to perform as a Class A interior finish material.

Asbestos Containing Building Materials and Lead Paint

Two asbestos surveys have been conducted on Delta-01 to determine the presence of asbestos containing building materials (ACBMs) (see Appendix D). The first report was published on January 3, 1994 by Intermountain Technical Services, Inc., of Rapid City, South Dakota, and commissioned by Ellsworth Air Force Base, South Dakota. The second report was published in 2009 by Anderson Environmental Services, of Belle Fourche, South Dakota and commissioned by the National Park Service.

The 1994 report identified the following materials as containing the asbestos in the form of chrysotile or amosite:

- Floor tile under carpet & mastic (the amount of square footage identified would suggest this is all the original 9” x 9” vinyl asbestos and asphalt tiles in the Dining and Recreation Room, adjacent Storage Closets, Bedrooms, Corridors, Linen Closet, and Kitchen) now beneath carpeting.

- 9" tan floor tile & mastic (assumed to be in the Launch control center).
- Mudded pipe joints on the mechanical piping.
- Exhaust stack insulation
- Roof caulk on the Launch Facility Support Building and the Vehicle Heated Storage Building.
- Vibration isolator in the Vehicle Heated Storage Building.

The 2009 report identified the following materials as containing asbestos:

- Mudded pipe joints throughout.
- 12" floor tile, grey from the LCC
- Metalbestos chimney.
- 9" floor tile from West (Linen) Closet.
- Flat panels (transite) from weapons locker in Security Control Center.
- LCC vent insulation, grey – silver foil covered flex duct on top of the LCC.

No lead paint testing has been performed to date at Delta-01.

Building Systems[11]

Heating, Ventilating, and Air Conditioning: The building has two mechanical systems. One system serves the Launch Control Facility and one system serves the Launch control center.

The LCF system consists of a hot water heating system and a chilled water cooling system. The hot water heating system consists of a Kewanee Model 3R1-KO gas fired boiler with a capacity of 324 MBH, two circulating pumps and radiation units. Heating for the space is accomplished using a radiant heat (hot water system) delivered through baseboard wall fins and convectors. This appears to have been the original heating system for the building. The boiler burner and the circulating pumps have been replaced recently.

The chilled water system was added to the building sometime after the original construction. It consists of an air cooled chiller unit with a split evaporator. The evaporator is located at the ceiling in the boiler room. The chiller is located at the back of the building. The refrigerant lines run from the chiller to the evaporator which generates chilled water for the building. Two chilled water pumps supply chilled water to three fan coil units located in the living/dining area and one fan coil unit located in the first floor security room.

Both the heating and cooling systems have been upgraded recently and appear to be in good shape. Anticipated life of the present system is estimated at 10+ years.

[11] Provided by Affiliated Engineers, Inc.

The systems for the Launch Control Center are original to the construction of the structure. The cooling for the center was accomplished by the use of a brine chiller. An air handling unit located in a room next to the chiller provided conditioned air to the capsule area. The air supply was maintained at 55°F and the return air was 77°F. These units are located on ground level in rooms attached to the main building. These units were on a 120/208 power source and also on an emergency generator. The control center also has an emergency air handling unit that could supply air if the ground side unit was made inoperable. The equipment that serves the Launch Control Center is not in use.

Electrical: There appears to be adequate power for the Launch Control Facility as it is presently being used. The original building had an Allis Chalmers diesel engine generator set that provided emergency power for the building as well as the Launch control center. There is a day tank in the room for the generator that was fed from underground oil tanks. These underground tanks have been removed from the site. This unit is no longer operational. From what the team was able to observe, it appears the electrical system was installed per code requirements at the time of installation. No items of non-compliance with existing codes were observed.

A new LP gas fired emergency generator was installed by the NPS just outside the fence on the northeast corner of the building. This generator is sized to provide emergency power to the elevator motor, the building heating system and some lighting in the building and on the site.

Delta-01 Vehicle Heated Storage Building

The 32 foot by 40 foot, three-bay, gable roof Vehicle Heated Storage Building was constructed ca. 1968 to match the look and materials of the adjacent Launch Control Facility. The building is in good condition due to the maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service and the exterior and interior upgrades received in the mid-1980s. This analysis will address both exterior and interior materials, as well as building systems, as they existed during physical inspections that took place in 2008 and 2009. As additional information is gathered or discovered during on-going research, this section will be amended.



Figure 3- 66: Vehicle Heated Storage Building, south elevation (source: QEA 0019)

Exterior Envelope, Vehicle Heated Storage Building

Foundation: The 8 inch thick reinforced concrete foundation wall is in good condition. The face of the wall is painted the trim color of a dark chocolate brown. The paint is in good condition.

Siding: The pre-finished tan colored, wood grain embossed, prefabricated steel siding (8" exposure), which replaced the original asbestos cement shingle siding in the mid-1980s, is in good condition with several dings, gouges, and dents throughout the four elevations. The exterior and interior corner trim and door surrounds (dark brown) are also in good condition. There are no indications that the siding is not functioning as expected for its age and condition.

There are various other elements on the field of the metal siding on each elevation and are itemized as follows:

South Elevation:

- Concrete filled steel bollards flank each of the three bay doors, painted dark brown, in good condition.
- Caged, exterior light fixtures flank the center bay door in good condition.

West Elevation:

- A steel pipe, painted yellow, is an abandoned vent from an oil tank that was below the side-walk, now removed.
- A second steel pipe stub sits adjacent to the vent pipe, not painted, and may have been the fill tube for the oil tank. (verify)
- A single caged, exterior light fixture is located between the two man doors in good condition.

North Elevation:

- A small intake louver with screen is high on the wall near the northwest corner and provides fresh air to the furnace in the heater room. The vent surround is tan color and the vent is in good condition (figure 3-67).
- A propane connection is stubbed-up at the northwest corner to provide fuel to a new furnace unit that will be, in the near future, replacing the extant unit.
- Two electrical conduit stubs daylight at the northwest corner and the wires penetrate the siding low on the building into the heating room.

East Elevation:

- One unpainted vertical electrical conduit stubs out of the ground near the southeast corner and enters the building low on the wall; in good condition. The conduit was installed by the NPS for the current security system.



Figure 3- 67: Vehicle Heated Storage Building, north elevation (source: QEA 0024)

Doors: The original painted solid core wood doors were replaced with painted hollow metal doors, presumably during the circa 1983 period, although the current known documentation does not include them. They are in good condition. The NPS replaced the locksets and added the strike covers. The original sectional insulated metal, chain hoist operated, overhead doors were replaced last year by the NPS using the same manufacturer, "Overhead Door" as the original with a

slight variation in appearance (figure 3-66). Doors are pre-finished white and are in good condition.

Gutters and Downspouts: The original gutters and downspouts were replaced circa 1983 with new aluminum gutters and downspouts along with new aluminum soffit and fascia panels and trim strips installed over the existing wood soffit and fascia boards. The gutters and downspouts were replaced again, in kind, by the NPS in 2008. Soffit and fascia panels, trim strips and gutters were pre-finished the dark brown trim color; downspouts are painted tan. All are in good condition (figure 3-68). New concrete splash blocks were installed at the same time, painted dark brown and are in good condition.



Figure 3- 68: Vehicle Heated Storage Building, gutters, downspouts, and vent (source: QEA 0026)

Roof: The original roof had dark green asphalt shingles over 15 pound building felt over 1/2" plywood sheathing. These were removed and replaced, circa 1983, with Certainteed Saf-T-Lok Class C 2-tab, Timber Blend color. The NPS removed the second roof and replaced it in-kind in 2008 with Certainteed Custom-Lok 25, Timber Blend color. The roof is in good condition.

- The furnace flue penetrating the roof on the northwest corner, painted the dark brown trim color, is in good condition.
- An electrical conduit with waterproof head and electrical feed penetrates the roof adjacent to the flue, is painted dark brown and in good condition.

Sidewalk: Concrete sidewalk on the west side of the building is in good condition. The exposed edge is painted dark brown. One door holder for the Heating Room door is mounted on the top of the walk and is in good condition.

Interior Finishes

Vehicle Storage Room

Floor: Original concrete in fair condition showing moderate wear and tear. It appears that it has previously been sealed and waxed and the wax may have yellowed with age.

Walls: Painted and unpainted hardboard in good condition, with some minor wear and tear (figure 3-69).

Ceiling: Exposed unpainted roof rafters, batt insulation, and wire mesh to hold in the insulation, all in good condition.

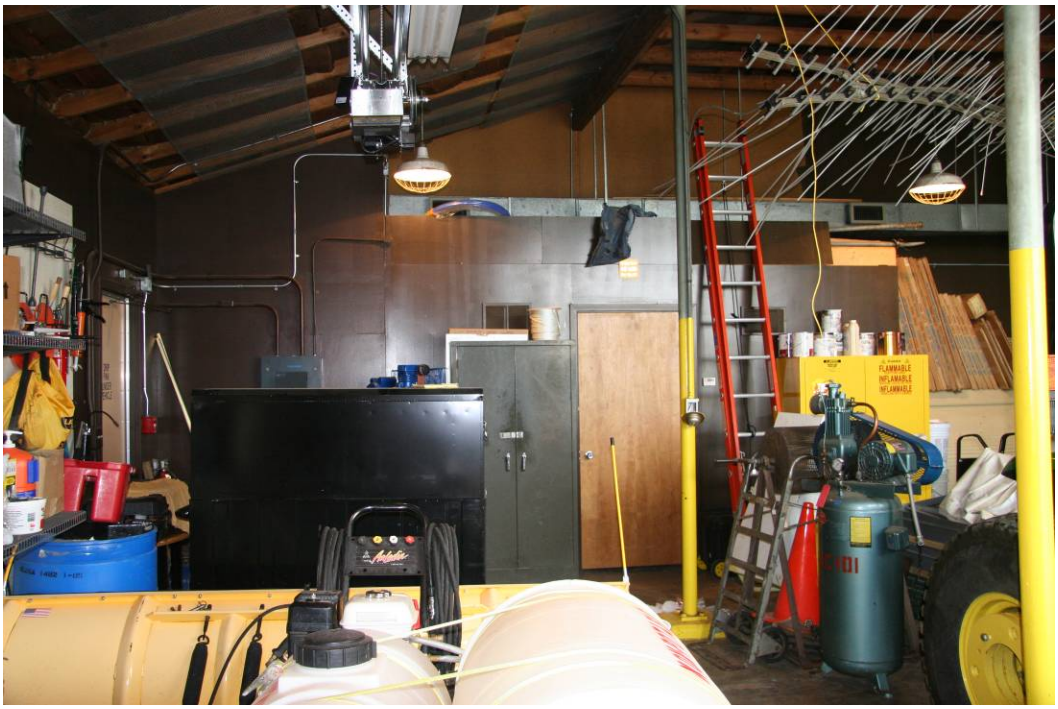


Figure 3- 69: Vehicle Heated Storage Building interior, looking north (source: QEA 0049)

Heater Room

Floor: Original concrete in fair condition.

Walls: Painted drywall in good condition with minor wear and tear.

Ceiling: Painted drywall in good condition.

Tool Storage Room

Floor: Concrete in fair condition.

Walls: Painted hardboard in good condition.

Ceiling: Painted hardboard in good condition.

Delta-09 Launch Facility

The underground Launch Facility and support building is in good condition due to the maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. This analysis will address the exterior condition of the glass enclosure and above ground portion of the Launch Facility as they existed during physical inspections that took place in 2008 and 2009. Reference the structural section of this report for the condition of the support structure. The underground portion of the Launch Facility was not accessible during the survey effort. As additional information is gathered or discovered during on-going research, this section will be amended.

Launcher Closure and Launcher Apron

The original concrete apron is in good condition with some moderate spalling and cracking in selective areas around the perimeter, along with some paint erosion (figure 3-70).

- The original Launcher closure concrete and steel plating is in good condition, repainted in 2001 when the viewing enclosure was installed.
- The original concrete retaining walls are in good condition with some minor cracking and spalling on the south faces.
- The original concrete and steel closure tracks are in good condition, repainted in 2001 when the viewing enclosure was installed.
- The steel personnel access hatch is in good condition. The caulking at the perimeter edge has lost its adhesion and should be replaced.
- The original painted steel pylons are in good condition, repainted in 2001 when the viewing enclosure was installed.



Figure 3- 70: Delta-09 Launch Facility launch closure and viewing enclosure, looking west
(source: QEA 8308)

Viewing Enclosure

The aluminum and glass viewing enclosure and concrete base, installed in 2001, is in very good condition.

Stainless steel handrails and guardrails, installed in 2001, are in very good condition.

Delta-09 Asbestos Containing Building Materials and Lead Paint

No asbestos or lead paint surveys have been performed at Delta-09.



Figure 3- 71: Delta-09 Silo interior and missile training model (source: QEA 3988)

Existing Conditions: Structural

Methodology

The survey was performed on May 4 and 5, 2008, and consisted of review of material at the park archives and at Ellsworth Air Force Base, and physical non-destructive inspection. Park staff and Ellsworth AFB provided Parsons-Staver drawings for the project which were reviewed. Additional historic documentation of maintenance for the facilities was also reviewed. Field notes were made during the physical survey and digital photos were taken. A photo log was kept and transcribed to digital format.

Delta-01 Launch Control Support Building, Existing Structural Conditions

The LCF support building housed the security and maintenance personnel and the Air Force Missileers for the Delta Flight. The above grade structure is principally a one story steel sided wood frame building. The east end of the building rests over the below ground Launch Control Center (LCC). The center controlled 10 remotely located missile silos. The LCC is essentially a hardened concrete cocoon shape isolated from access by a heavy massive vault like door. The control center itself is a metal structure suspended inside the concrete cocoon.

Sill and Foundations: The foundations and exterior door sills appear to be in good condition. A sill crack was noted at door 106, but the crack has been previously painted over and the paint shows no re-cracking.

Roof Framing: Access was gained to the attic space of the LCF. The wood framing generally conforms to the Parsons-Staven drawings and appeared in good condition (see figure 3-72). The roof ridge lines appeared to be straight and true. Some flaking paint was noted at the ceiling of the Generator Room 105 (see figure 3-73). This occurred at the edge of the roof ventilator and is likely due to a flashing problem around the ventilator curb. Reportedly, the problem has been corrected.

It was not possible to access the connection between the roof and the wall framing to determine the resistance to wind load. Review of the Parsons-Staven drawings (Job No. 1880-1, dated 1961) does not show the specific mechanical connection between these elements. However, drawing sheets 370, 371, and 372 indicate that the wall framing has "let-in" 1" x 4" diagonal bracing. This occurs at all exterior walls as well as many of the interior partitions both in the longitudinal and transverse directions. Additionally, the details show ½" diameter anchor bolts through the wall sill plates at 4 foot centers at the exterior walls and the interior partitions. This would certainly indicate that high wind load was considered in the original design. Also, the roof appears in good condition with no apparent distress from wind load over the life of the building (early 1960s). It would be prudent to visually inspect the connection at some time when roof repairs or re-roofing is needed to determine how the roof is anchored to the walls by removal of isolated areas of sheathing.



Figure 3- 72: Launch Control Support Building attic (source: FSE 1054)



Figure 3- 73: Launch Control Support Building, flaking paint at Generator Room 105 (source: FSE 1056)

Site Drainage: Site drainage around the LCF is very poor. During rains, water pools next to the foundation (see figure 3-46). This condition can cause long term deterioration of the foundations and the base of the wood wall framing.

Launch Control Center (Capsule), Existing Structural Conditions

Access was gained around the interstitial space between the concrete cocoon and the metal command module around the south side to the east end. The concrete was observed to be in very good condition where visually exposed.

Delta-01 Vehicle Heated Storage Building, Existing Structural Conditions

General: This structure is a wood frame structure with additions located west of the LCF. Generally, the framing appears in good condition.

West Exterior Slab: A walkway slab on grade extends along the west exterior side of the building. Reportedly a diesel tank was removed from under the sidewalk. This resulted in settlement of the slab. The NPS had the slab mudjacked to correct the problem.

Delta-09 Launch Facility, Existing Structural Conditions

Generator Vault: The support building for the LF is a concrete vault below grade that houses a generator, electrical equipment and panels, and communications equipment. The interior of the vault measures 14'-0" x 24'-2" in plan according to the Parsons-Staven drawings. The vault room is shown as 11'-0" from top of foundation slab to top of vault slab. There are two large covered access hatches in the top slab. The covers rest on short concrete stub walls. Areaway extensions occur at the north and south ends of the vault. The south areaway is covered with steel plate. The north areaway is covered with steel grating and vertical access into the vault by ladder is located at this areaway. The foundation is a 12 inch thick slab below the entire vault and there is a sump pit below the generator. Vaults walls are shown as 10" thick at the exterior (grade against the walls) and 8" thick elsewhere. A plan layout is shown in figure 3-74. A 2-1/2" concrete wearing slab containing wire fabric reinforcing was placed over the structural slab at the top of the vault. This wearing slab is separated from the structural slab with a 'WATERPROOFING POLYVINYL SPRAY MEMBRANE' according to sheet 378 (A-9) of the Parsons-Staven drawings. Generally, the drawings indicate that the vault was well detailed and properly reinforced.

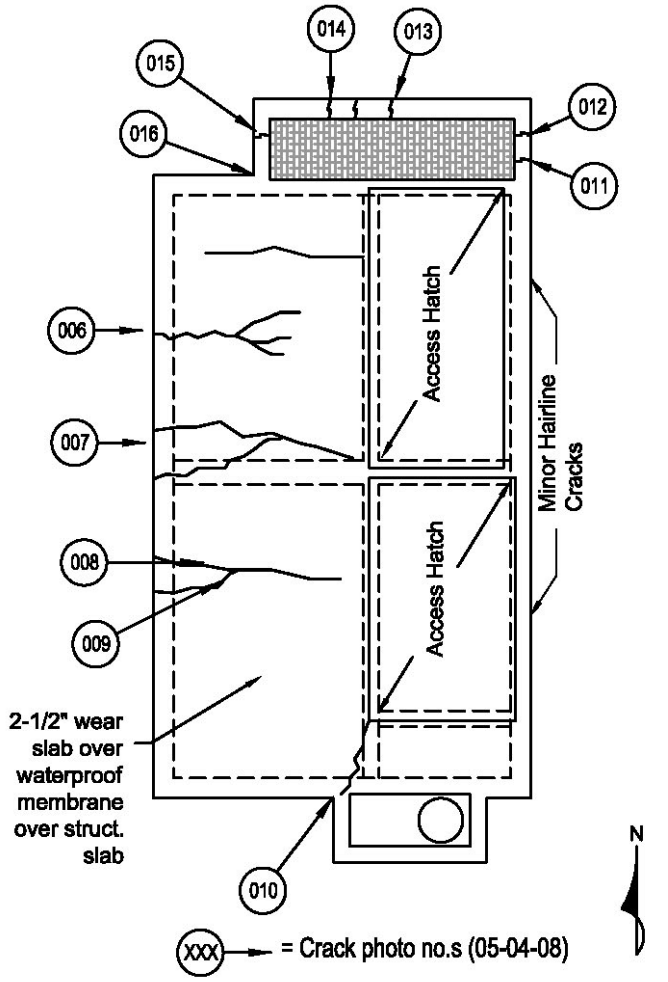


Figure 3- 74: Top Plan View of Vault

Exterior Wearing Slab: Figure 3-74 shows crack patterns observed during the survey. These cracks presumably occur only in the topping slab as this slab is isolated by the waterproofing membrane for the concrete below. The crack patterns are typical for shrinkage and thermal movement and probably showed up within the first year after construction. There has been some previous attempt to patch the cracks as can be seen in figure 3-75. The patching material appears to be a thin cementitious coating over the cracks that has worn away. There is no evidence of injection ports along the cracks.

Generally, this type of cracking does not present a serious structural concern. However, moisture can easily penetrate into the cracks and the slab will be subject to long term deterioration due to freeze/thaw action. It does appear that the waterproofing membrane is working to protect the structural slab. Moisture was observed migrating out from between the wear slab and the structural slab as shown in figure 3-76.



Figure 3- 75: Previously patched cracks at Delta-09 (source: FSE 010)



Figure 3- 76: Moisture migrating out from cracks at Delta-09 (source: FSE 051).

Interior of Vault: Access was gained to the interior of the vault. Generally, the concrete walls, roof, and floor appear in good condition with no obvious sign of cracking distress. The floor does show water staining and there was standing water on the floor near the north end of the vault. This condition is likely due to water coming in from under the door at this location. Additionally, there are penetrations in the vault walls which may also contribute to the water on the floor.

Silo: Access to the interior of the silo was not provided during the survey. Viewing from the skylights revealed no obvious concerns. The park personnel indicated that there were no water problems associated with the silo. Review of the Air Force maintenance documents indicated there had been water problems with many of the sites and that many methods were tried to alleviate the condition with limited success. It was not possible to determine the specific sites or if Delta-09 was included in that effort. If there is currently no water problem then either the Delta-09 site was not affected or remedial treatment has worked.

Concrete Apron at Missile Silo: The concrete apron at the north side of the silo shows cracking and surface deterioration of the slab. Figure 3-77 illustrates the cracking condition as well as showing a loss of the surface matrix or cement paste due to erosion and freeze/thaw action. Additionally, there is cracking of the concrete and grout near the silo metal plates as shown in figure 3-78.



Figure 3- 77: Slab deterioration at north side of silo (source: FSE 038).



Figure 3- 78: Cracking of grout and concrete near silo metal plates (source: FSE 049)

Silo Cover Head Walls: Cracking was observed in the head walls (wing walls) extending east and west of the silo. Figure 3-79 illustrates this cracking. The cracking does not pose a serious structural concern at this time and is fairly fine in terms of width of crack. However, with moisture penetration and long term freeze/thaw action the distress can be expected to worsen.



Figure 3- 79: Cracking in head walls at silo (source: FSE 040)

Existing Conditions: Cathodic Protection[12]

Cathodic Protection was installed at many of the Minuteman Sites in the early 1980s. Delta-01 and Delta-09 both received systems that were commissioned on August 3, 1983. The purpose of the cathodic protection system was to protect steel buried in the ground at each site. The style designed for this protection is a deep well anode bed. A 10" diameter hole was drilled a total of 220 feet and (8) 3-inch by 72-inch graphite anodes were installed, and backfilled with coke breeze. Cables were then routed to a junction box with shunts, and a rectifier. A negative grounding grid was placed around the entire facility to ensure electrical continuity to each structure that required protection and routed back to the rectifier.

Cathodic protection works by impressing a DC voltage into the anodes; current travels from the anodes through the soil and onto the structure. Current then leaves the structure by way of the negative connection attached to each structure being protected, and goes back to the rectifier completing the electrical circuit. When cathodic protection is not working and or not present, a loss of material occurs. If the system is working and current is entering the ground, but the negative connections have been disrupted, the structures can also experience damage through loss of material. Depending on the soil conditions this may take years, but it can happen within months as well. The typical life span of these types of systems range from 20 to 25 years.

Delta-01 Launch Control Facility, Existing Cathodic Protection

The structures at this location measured between -0.33 and -0.61 volts, while the rectifier measured -1.39 volts to a fixed reference, demonstrating a lack of electrical continuity. In a properly functioning system, these numbers would be common (all the same). These non-common numbers mean that the current applied on the structures from the anodes does not have a path off the structures back to rectifier, resulting in potential damage to the structures. During the test a temporary negative was made to energize the system, and the rectifier was found to be functioning properly and six of the eight anodes were producing current.

> ***Rectifier Information:*** Model: PATSB 36V-34A Serial: 82D252
> The output of the unit at the time of survey was 15.8 volts and 0 Amps with tap settings at Coarse=B and Fine=3. This indicated that the rectifier was pushing out 15 volts to the anodes but had no current, indicating a break in the negative grounding grid. The coarse and fine settings indicate the amount of current the rectifier is set at to push out to the anodes; this can be dialed higher or lower depending on the design of the system.

[12] Provided by CorPreTek Incorporated.

Delta-09 Launch Facility, Existing Cathodic Protection

The structures at this location measured between -0.30 and -0.59, while the rectifier measured -0.60 to a fixed reference, again demonstrating a lack of electrical continuity; the numbers were not common (the same). The rectifier was also found to be not functioning properly, thus further investigation for anode condition was not available. The electrical power feed from the adjacent overhead power pole had been disconnected from the junction box, therefore no electrical power was going to the rectifier.

> ***Rectifier Information:*** Model: Universal APB 24V-22A Serial: 830618
> The rectifier would not power up at the time of survey. Power was available.

Testing indicated that the cathodic protection system is non-operable at both Delta-01 and Delta-09. Both negative grounding grids were no longer functioning and the rectifier at Delta-09 is no longer functioning. The systems will be 27 years old as of August 2010, well past their projected life. Repairing these systems is difficult with no guarantee as to the system ever working properly or efficient again or for how long and is usually not cost effective. The length of time for depletion of the anodes cannot be accurately determined with a repaired system.

Replacing the system with a new engineered system can be accomplished, for the most part, outside of the perimeter fence with minimal trenching inside the fence to re-establish a new negative grounding grid. A lack of cathodic protection means loss of material; this can mean considerable damage to the integrity of the underground structures.

Environmental Assessment Impact Topics

Socioeconomics

Population

The scattered sites of Minuteman Missile NHS are located in Pennington County and Jackson County. However, given its proximity, Shannon County will also be represented in the socioeconomic geography.

The area around Minuteman Missile NHS is rural. Jackson, Pennington, and Shannon Counties have population densities of 1.4, 35.3, and 6.5 people per square mile respectively. The southern half of Jackson County and all of Shannon County are located within the Pine Ridge Indian Reservation. The density of Pennington County is higher because of Rapid City and Ellsworth Air Force Base (AFB). These population centers are approximately 50 miles west of Minuteman Missile NHS.

Over the last 80 years the population of Pennington County and Shannon County has steadily increased. Jackson County on the other hand has witnessed a continual population fluctuation between 1,500 people and 3,500 people. Over the last decade, Shannon and Pennington both increased in population while Jackson lost population.

The composition of the population of the three counties is quite varied. At 87%, Pennington County is mostly white. Native Americans make up 8% of the County's population. Shannon County on the other hand is 86% Native American and 9% white. Jackson County's population is roughly divided equally between Native Americans and white residents.

Income

Income indicators show large disparities between the three counties. The per capita income of Pennington County residents is twice that of Jackson County and three times higher than Shannon County. Poverty rates and unemployment rates are significantly higher in Jackson and Shannon Counties than in Pennington County. Native Americans are disproportionately affected by the low economic indications.

Table 3-3
Census Data

	Jackson County	Pennington County	Shannon County	South Dakota
Total Population				
2000 Pop.	2,930	88,565	12,466	754,844
2008 Pop. Est.	2,711	98,533	13,637	804,194
Racial Composition				
White 2000	50%	86.7%	4.5%	88.7%
White 2008	47.2%	86.7%	9.1%	88.2%
Native Amer. 2000	47.8%	8.1%	94.2%	8.2%
Native Amer. 2008	50%	8.2%	85.5%	8.4%
All Others 2000	2.2%	5.2%	1.3%	3.1%
All Others 2008	2.8%	5.1%	5.4%	3.4%
Economic Factors (2000)				
Per Capita Income	$9,981	$18,938	$6,286	$17,562
Per Capita Income – Native Americans	$4,771	$7,895	$5,924	
Poverty Rate	36.5%	11.5%	52.3%	13.2%
Poverty Rate – Native Americans	60%	44%	52.6%	

Source: US Census Bureau

Economic Resources

The largest single economic activity in the region of Minuteman Missile NHS is tourism. The South Dakota Office of Tourism records statistics reporting that the southwest quadrant of the state receives almost 60% of all tourism dollars spent in South Dakota. Pennington County alone earned 28% of all tourism dollars spent in the state in 2008. The Office of Tourism also uses a multiplier of 2.5 to estimate economic impact of tourism spending. A summary of the most recent number can be found in the table below.

Table 3-4
Tourism Impacts - 2008

	Jackson County	Pennington County	Shannon County	South Dakota
Tourism Spending	$8.8 Million	$271.6 Million	$1.3 Million	$967 Million
Economic Impact	$22 Million	$679 Million	$3.2 Million	$2,417 Million

Source: South Dakota Office of Tourism

Visitor Experience

Minuteman Missile NHS is a relatively new National Park Service unit. The first full visitor season began on Memorial Day, 2003. Since that weekend, the number of visitors to Minuteman Missile NHS has risen dramatically. This is not surprising considering the proximity of Minuteman Missile NHS to Badlands National Park (NP), which receives approximately 1 million visitors per year. Table 3-5 summarizes visitation to Minuteman Missile NHS over the past 4+ years. The site's website has also received a similar increase in "hits" which corresponds to the increase in visitation. The continued increase in visitation was anticipated. A 2003 transportation study estimated that visitation could eventually reach 3-400,000 visitors per year.

Table 3-5
Visitor Statistics FY 05-07

	Visitors	Number of Tours	Visitors on Tour
FY 04	3,458	120	1,305
FY 05	5,211	265	2,292
FY 06	11,874	408	4,329
FY 07	16,802	702	7,267
FY 08	21,843	846	9,311
FY 09	26,434	898	10,403

Source: Minuteman Missile NHS

Another likely reason for continued growth in visitation is the relative proximity to many other attractions in the region including Badlands NP; the National Grasslands Visitor Center in Wall, SD; Wind Cave NP; Jewel Cave National Monument; Mount Rushmore National Memorial and the Crazy Horse Memorial. In addition to these and many more natural and cultural attractions, the South Dakota Air and Space Museum at nearby Ellsworth AFB is a particularly attractive to visitors interested in military history.

Minuteman Missile NHS visitor contact is primarily conducted at the visitor contact and administrative center at exit 131 on Interstate 90. This highway exit is also one of the primary entrances into Badlands NP, which benefits visitation at Minuteman Missile NHS. Visitors can watch a film on the site, receive brochures and other information regarding Delta-01 and Delta-09 at the visitor contact center. If visitors have not already, they can make reservations or join a site tour of Delta-01. At this time, visitors are required to drive their own vehicles to both Delta-01 and Delta-09.

With some exceptions, Ranger-led tours of Delta-01 are offered twice a day, six days per week during the summer season. During the shoulder seasons (May and September) the tour schedule is reduced to five days per week. During the winter season (October through April) one tour per day Monday through Friday is offered. An open house tour is offered on Thursdays during the summer that provides visitors an abbreviated tour of Delta-01. Limited ranger-led interpretation occurs at Delta-09 and there are no tours

offered. In addition to ranger-led tours and interpretation, visitors have the option of utilizing their cell phone to listen to information regarding Delta-09.

National Park Service staff has prepared the Long-Range Interpretive Plan (LRIP) for Minuteman Missile NHS that establishes goals for visitor experience and recommendations for implementing that goal. Recommendations for providing a unique visitor experience are being implemented.

Because no formal tour is offered at Delta-09, there is no apparent visitor capacity issue at that site. There is a visitor capacity issue at Delta-01. Because of facility limitations only six people are allowed on each tour. In addition to limiting tour capacity, safety of visitors is enhanced through the establishment of "rules" and guidelines that need to be agreed and adhered to by visitors. These include ability to climb a ladder, height limitations for visitors and the ability to be comfortable in tight spaces. Prior to opening Delta-01 for tours, a number of public safety measures were undertaken.

Park Operations

The Visitor Contact facility is currently in temporary facilities located adjacent to a gas station at exit 131 on Interstate 90. Delta-01 occupies 6.4 acres and Delta-09 occupies 5 acres of land. Delta-01 is approximately four miles from the visitor contact center and Delta-09 is approximately 15 miles from the visitor contact center. All NPS operations are conducted out of the visitor contact center and administrative facility. Currently there are six full-time, permanent employees and six seasonal employees. Ranger-led tours are conducted at Delta-01. Visitors are required to join a tour to enter the perimeter fence at this site. Visitors are encouraged to visit Delta-09 on their own.

Park staffing is as follows:

Full-Time
- Superintendent
- Administrative Support Assistant
- Chief of Law Enforcement and Interpretation
- Cultural Resource Specialist
- Facility Operations Specialist
- Interpretive Park Ranger

Seasonal
- Park Ranger/Law Enforcement (1)
- Seasonal Park Guides (3)
- Maintenance Laborers (2)

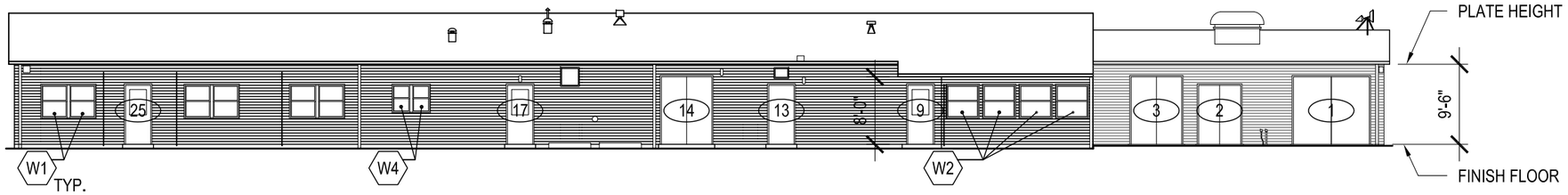
Next pages:

Figure 3- 80: Delta-01 Elevations, Existing Conditions (source: QEA 2010)
Figure 3- 81: Delta-01 Floor Plans, Existing Conditions (source: QEA 2010)
Figure 3- 82: Delta-09 Floor Plans, Existing Conditions (source: QEA 2010)

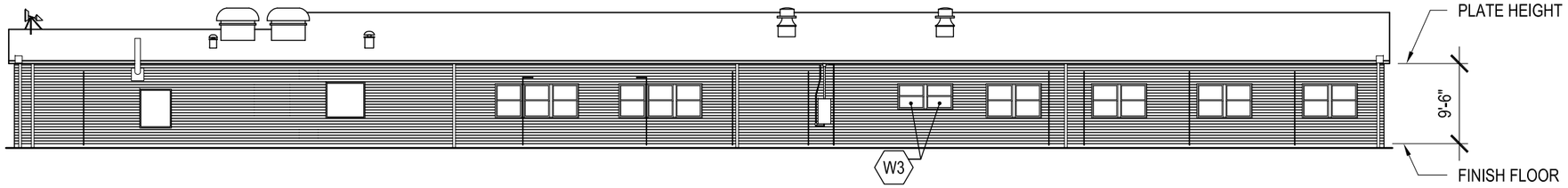
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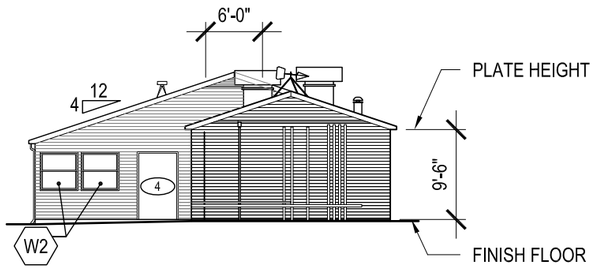
DELTA-01 ELEVATIONS
EXISTING CONDITIONS



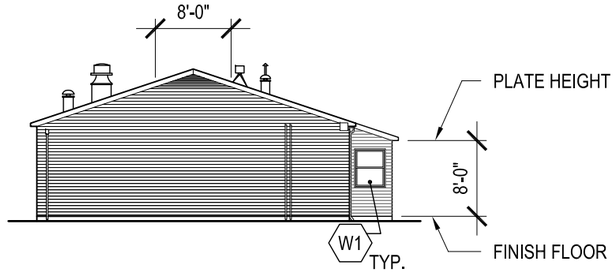
1 SOUTH ELEVATION



2 NORTH ELEVATION



3 EAST ELEVATION



4 WEST ELEVATION

16 8 0 16 32
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES

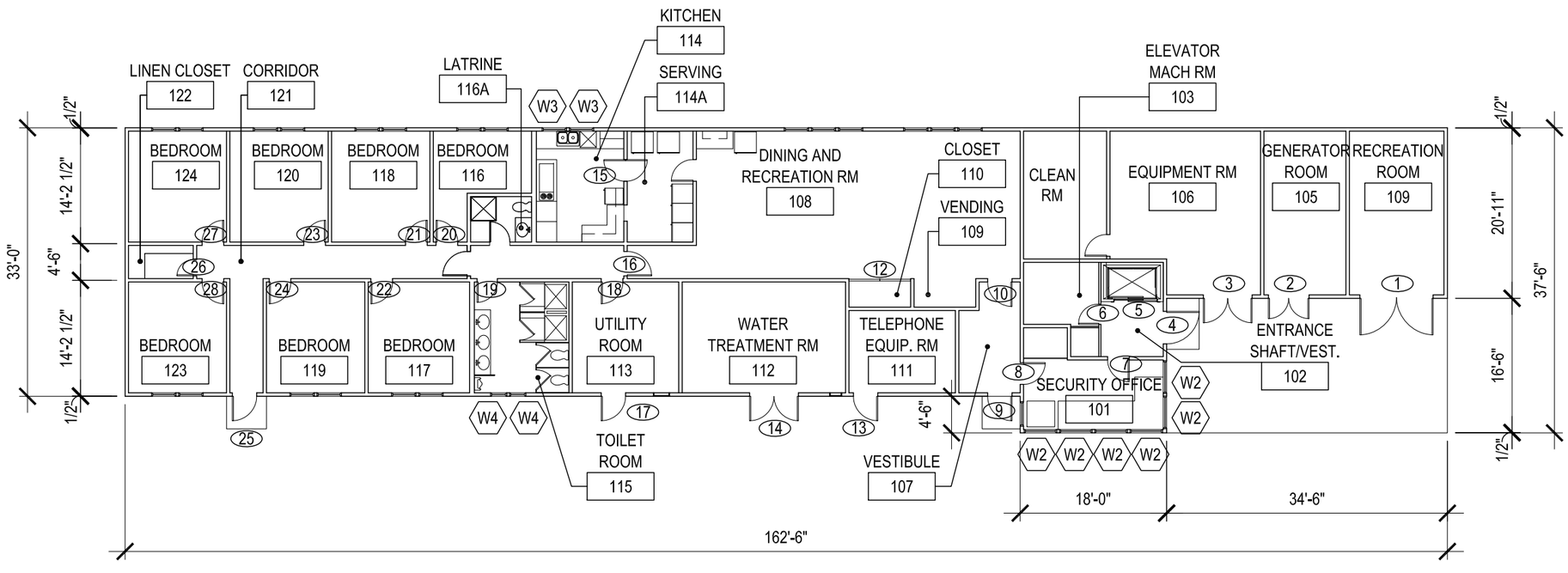
1. ALL WINDOWS ARE WINDOW TYPE W/1 UNLESS NOTED OTHERWISE.

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ARCHITECTS

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DELTA-01 FLOOR PLANS
EXISTING CONDITIONS



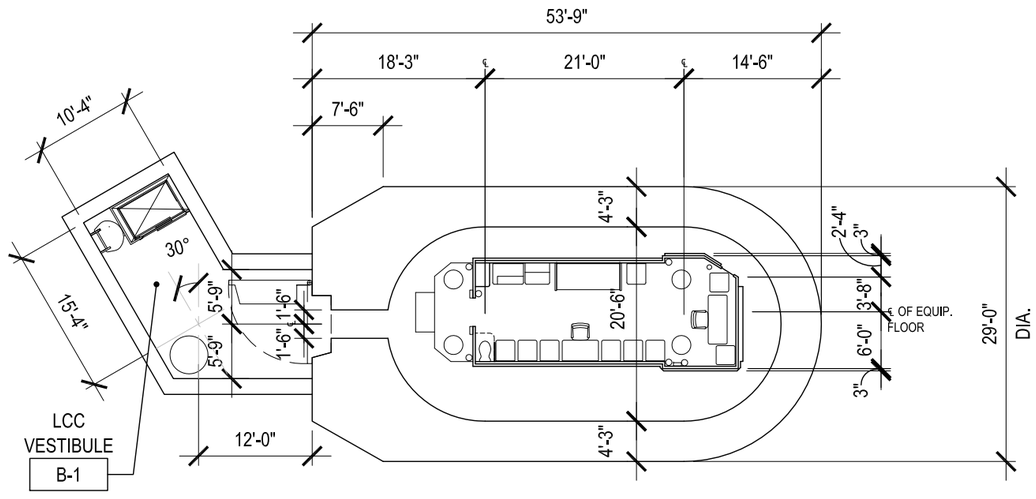
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NORTH

GENERAL NOTES

1. ALL WINDOWS ARE WINDOW TYPE W/1 UNLESS NOTED OTHERWISE.

1 LAUNCH CONTROL SUPPORT BUILDING FLOOR PLAN



2 LAUNCH CONTROL CENTER FLOOR PLAN

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DELTA-09 FLOOR PLANS

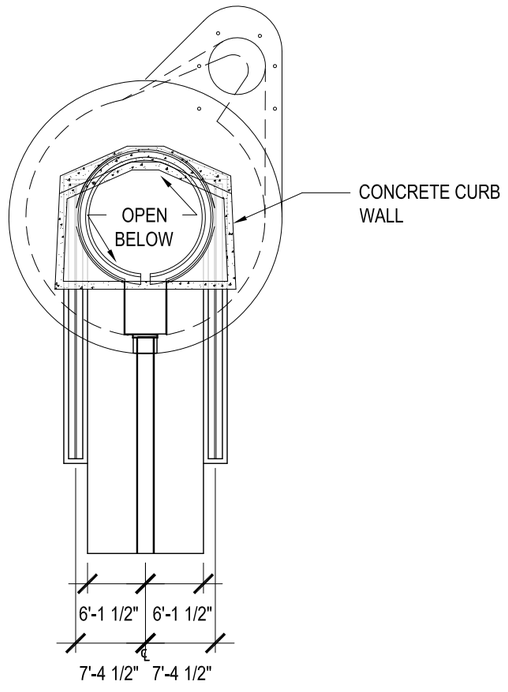
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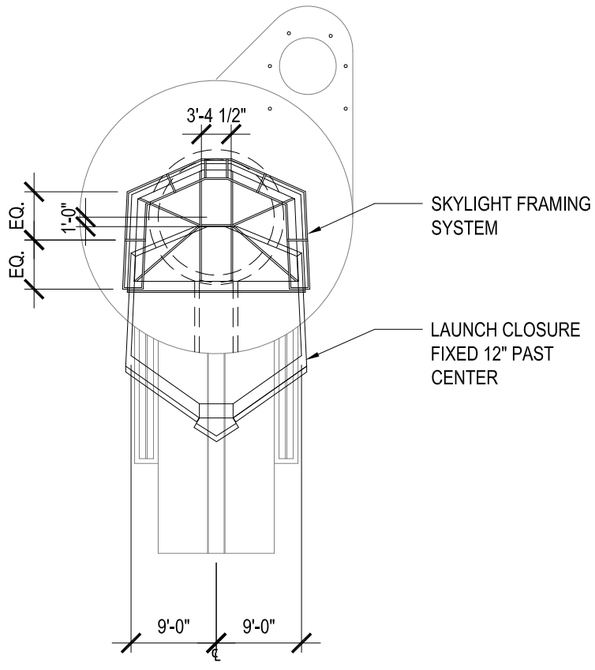
1/16"=1'-0" SCALE OF FEET

NORTH

GENERAL NOTES



1 FLOOR PLAN



2 ROOF PLAN

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Chapter 4: Building / Landscape Analysis and Evaluation

Chapter 4: Analysis

Existing National Register Status

Minuteman Missile National Historic Site was created by the 106th Congress by passing Public Law 106-115 on November 29, 1999.[1] Documentation of the significance of the property was prepared in 2004 and accepted by the Keeper of the National Register May 5, 2005.

Statement of Significance

The Delta Flight Launch Complex, originally associated with Ellsworth Air Force Base, is the only remaining formerly operational intact example of the original Minuteman basing configuration, designed to implement the Cold War policy of massive retaliation. Minuteman Missile NHS is the only museum in the United States that contains both a Launch Control Facility and Launch Facility of the Minuteman II Missile system. There are other sites available to the public as museums including: Oscar-01 at Whiteman Air Force Base in Missouri that preserves a Launch Control Facility; Oscar-00 in eastern North Dakota that preserves a Minuteman III Launch Control Facility; and November-33, near Cooperstown, North Dakota, that preserves the topside of a Minuteman III facility in its 1997 condition.[2]

The Minuteman Missile NHS complex is nationally significant under Criterion A in the area of history as a representation of the United States' early Cold War policy of massive retaliation. The complex, originally designed as Minuteman Ib and updated to Minuteman II, physically represents policies and products of the Cold War. Technologically the complex is nationally significant under Criterion C: Engineering as an intact example of the Minuteman II system and for its ability to demonstrate major technological advancements in missile technology.[3]

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[1] Public Law 106-115, 106th Congress, 16 U.S.C. 461 note.
[2] Mark Sundlov, site manager of the Ronald Reagan Minuteman Missile State Historic Site, email to Michael Hosking, resource manager, Minuteman Missile National Historic Site. It is not clear if the Launch Facility at November-33 was imploded or filled. All of the below ground portions of the site are inaccessible.
[3] Slattery, Schill, and Squitieri, "Minuteman ICBM Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base" (National Register of Historic Places Nomination), Section 8 page 26.

Period of Significance

The period of significance spans from 1963 when the facility was turned over to Strategic Air Command (SAC) and activated as a Minuteman Missile site, through 1993 when the Delta-01 and Delta-09 facilities were deactivated.

Historic District Boundary Description

The Delta Flight Launch Complex is a discontiguous historic district including two sites, Launch Control Facility Delta-01 and Launch Facility Delta-09. The boundary of Delta-01 includes 6.4 acres within the northeast quarter of the northeast quarter of Section 16, Township 2 South, Range 18 East including legal tracts FD-100, FD-103, FD-104 and FD-100E-1. The boundary of Delta-09 includes 90 acres within the northeast quarter of Section 26, Township 1 South, Range 16 East, including the south half of the northeast quarter of the northeast quarter, the southeast quarter of the northeast quarter, the east half of the east half of the southwest quarter of the northeast quarter, the southeast quarter of the southeast quarter of the northwest quarter of the northeast quarter, the northeast quarter of the northeast quarter of the southeast quarter, the east half of the northwest quarter of the northeast quarter of the southeast quarter, and the northwest quarter of the northwest quarter of the northeast quarter of the southeast quarter. The Delta Flight Launch Complex encompasses a total of approximately 96.4 acres. The boundaries of Delta-01 and Delta-09 are delineated on the historic boundary maps illustrated in Figures 4-1 and 4-2.

The boundary of Launch Control Facility Delta-01 and Launch Facility Delta-09 encompasses the areas that were historically used by the Air Force to operate Delta-01 and Delta-09. The boundary at Delta-01 corresponds to the 6.4 acre parcel that was transferred from the Air Force to the National Park Service. The boundary at Delta-09 was delineated to encompass the 90 acres of the site historically used by the Air Force. Ten acres were in an exclusive use area and included the area within the security fence. The remaining 80 acres, in concurrent use, were under ownership of the United States Forest Service and operated by the Air Force under a Memorandum of Understanding. The concurrent use area includes the azimuth markers located approximately 1,000 feet to the northeast and northwest of the missile launcher, the HICS markers south of the security fence, and the cathodic protection rectifier on the south side of the access road.[4]

[4] Slattery, Schill, and Squitieri, "Minuteman ICBM Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base" (National Register of Historic Places Nomination), Section 10 page 1.

Landscape Analysis Methodology

The analysis and evaluation of landscape integrity provided herein follows guidelines provided by the National Park Service and the *Secretary of the Interior's Standards.*[5] Landscape characteristics are the tangible and intangible aspects that collectively make up the historic character of a property. The analysis of these characteristics summarizes qualities and features to help managers understand the essence of the historic landscape that should be protected and possibly enhanced. The Minuteman Missile historic landscape analysis focuses on certain landscape characteristics including spatial organization, land use, circulation, topography, views, vegetation, buildings and structures, and small-scale features.

[5] Page, Gilbert, and Dolan, *A Guide to Culutral Landscape Reports: Contents, Process, and Techniques,* 1998; Birnbaum and Peters, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*; and McClelland, Keller, Keller, and Melnick, *National Register Bulletin 30: Guidelines for Evaluating and Documenting Rural Historic Landscapes.*

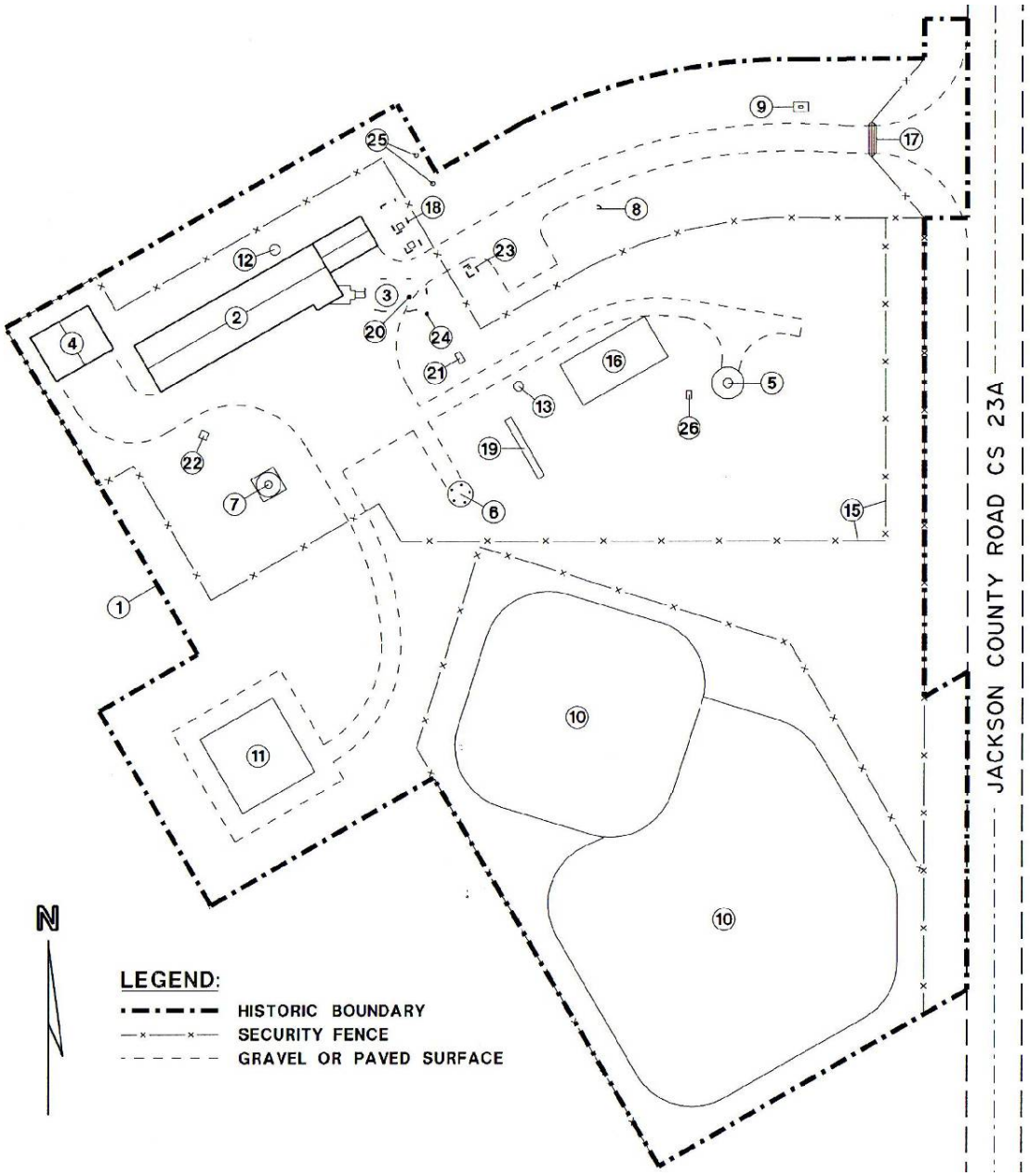


Figure 4- 1: Delta-01 Historic Boundary (source: National Park Service, Modified by Mead & Hunt, Inc., National Register Nomination for Minuteman Missile Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base)

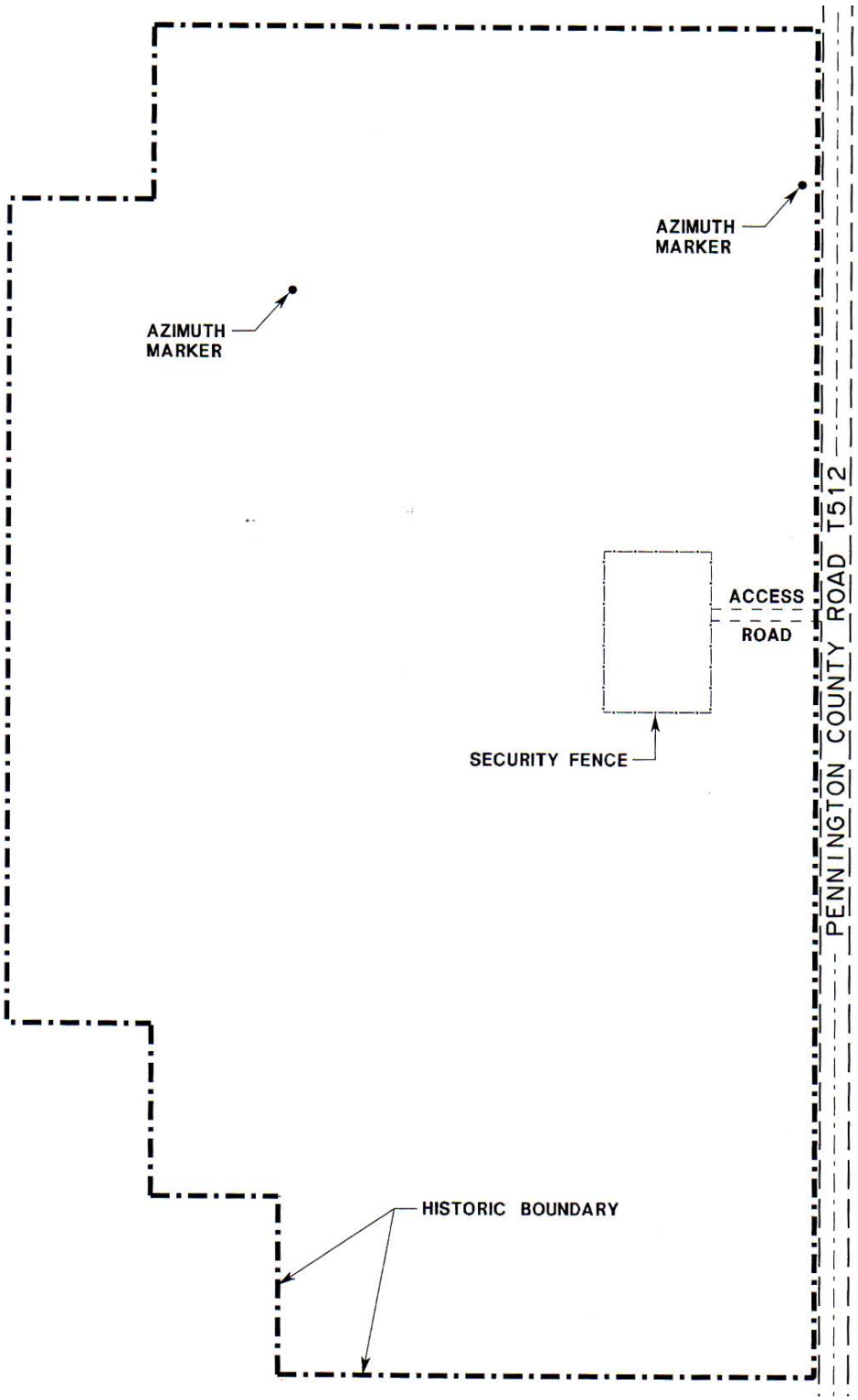


Figure 4- 2: Delta-09 Historic Boundary (source: National Park Service, Modified by Mead & Hunt, Inc., National Register Nomination for Minuteman Missile Launch Control Facility Delta-01 and Launch Facility Delta-09, Ellsworth Air Force Base)

Landscape Analysis, Delta-01

Spatial Organization Landscape Analysis, Delta-01

The arrangement of buildings, structures, and landscape features at Delta-01 remains intact, reflecting the functional layout of the site by the Air Force. Comparison of historic images to the current conditions reveals that the overall patterns have not changed (compare Figures 4-3 and 4-4 of historic conditions to Figures 4-5, 4-6 of existing conditions).

Only minor changes have occurred since the period of operation. These comprise the addition of elements on the site by the National Park Service, including a concrete pad, transformer, and generator at the northeast corner of the Launch Control Facility Support Building and a short electrical fence that runs from the same location to the cattle guard at the entrance drive (see Figure 3-19). In addition, an interpretive wayside has been added near the parking area on the outside of the security fence (see Figure 3-20), and a portable toilet has been placed at the southeastern corner of the heated vehicle storage building (see Figure 3-16).



Figure 4- 3: Oblique aerial view of Delta-01 and the surrounding area facing northwest during the period of significance, no date (source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-A-2)



Figure 4- 4: Oblique aerial view of Delta-01 facing west during the period of significance, no date (source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-A-1)



Figure 4- 5: View of Delta-01 facing north, northeast, June 2009 (source: QEA 3154)



Figure 4- 6: View of Delta-01 facing west, June 2009 (source: QEA 3695)

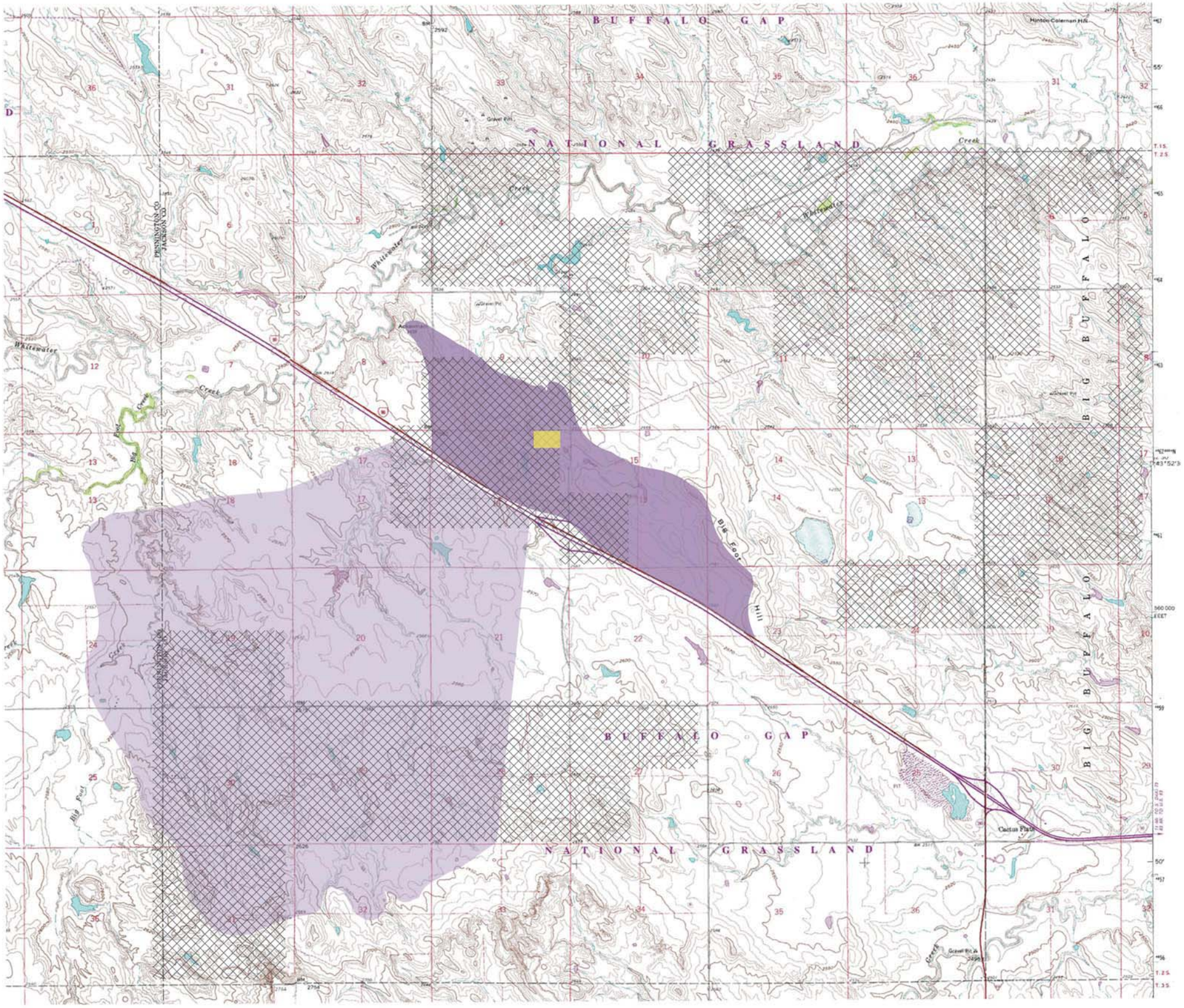
Land Use Landscape Analysis, Delta-01

Within the security fence at Delta-01, land use has changed from an active Launch Control Facility to an interpretive site. The property no longer houses missileers around the clock, and the activities associated with their presence at the site have halted. There is no longer a need to transport food and supplies into and out of the facility, or for the residents to maintain the facility and entertain themselves. Security needs at the site have changed as well. They are now related to protecting the historic resources, whereas historically a high level of military defense was in place. Although the historic land use is no longer present, the current use emphasizes an understanding of the historic activities through retention and interpretation of the historic features.

Land use beyond the security fence is unchanged since the period of significance. The majority of the surrounding property is utilized for ranch livestock grazing, and Interstate Highway 90 continues to provide a major transportation link that is visible to the south of the site.

The land immediately adjacent to the northern, western, and eastern boundaries of Delta-01 is privately owned, as are several large tracts that are within the historic views of the facility (see Figure 4-7). Since there are no land use controls that affect private property in the area, the use of these parcels may conceivably change at any time, potentially impacting the historic views from Delta-01. The only change in land use that has occurred since the period of significance is the addition of a cell tower immediately north of the site.

Next page: Figure 4- 7: Delta-01 Views and Ownership.



MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

DELTA-01 EXISTING OWNERSHIP & VIEWS

0 1000 3000 5000 7000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

- Privately Owned Land
- Delta-01 Foreground Views
- Delta-01 Background Views
- Approximate Location of Delta-01

SOURCES

USGS MAP
QE|A FIELD INVESTIGATIONS, JUNE 2009

QUINN EVANS
ARCHITECTS

The remainder of the landscape within view of Delta-01 is publicly owned as part of Buffalo Gap National Grassland. Since it is federally owned property, any proposed changes to land use would require consideration of the potential impacts that the alterations would have on Delta-01, thereby providing a high level of confidence that the historic land use will remain intact in the foreseeable future.

Circulation Landscape Analysis, Delta-01

Patterns of circulation on the site remain the same as they were during the period of significance. The locations and types of pavement of vehicular routes have not changed. Visitor parking is provided inside the fence for tours and outside the fence during open house events. Allowing parking inside the security fence creates potential impacts. The presence of vehicles within the fence could distract from the historic character of the site. Also, use of the historic area for parking could result in wear or damage to the historic resources.

Topography and Views Landscape Analysis, Delta-01

Topography at Delta-01 was altered for initial construction of the facility and subsequently for the addition of the helicopter landing pad and sewage lagoons. These alterations remain apparent as the historic topography of the site. Beyond the borders of Delta-01, there have been no known substantial alterations to topography since the activation of the facility in 1963.

Beyond the boundaries of Delta-01, the broader landscape slopes gradually down toward the south providing expansive views of the surrounding landscape (see Figures 4-7 through 4-10). The views reach the horizon several miles distant, revealing an open, undeveloped, grassland mostly devoid of trees, buildings or other vertical features. Exceptions include a “Wall Drug” billboard located to the southwest of the facility, and a cell tower perched on the high-point directly north of Delta-01. The billboard was present during the period of significance. The cell tower was constructed recently and is located in close proximity to the facility. Of particular concern is that the tower is within the view of the recreation/dining room window. Since the missileers spent large amounts of time in the room, and the view from the window is the main view from the common area, the view from this space is significant. The presence of the newly constructed cell tower within the view is impacting the historic view. It is not clear if this impact is ever perceived by visitors to the site, since the blinds in the room are kept drawn to protect the interior from the sun. The tower is very evident, looming over the building, and perceived by visitors who are outside discussing the overall site features.

Surrounding the site, the broad ground-plane is accentuated by the vast sky, which commands attention on both stormy and clear days. The views reach to a horizon defined by topographic features that rise above the surrounding landscape. The views at Delta-01

are significant due to their ability to help visitors imagine the feelings of remoteness experienced by the missileers.

While the views at Delta-01 are generally unchanged since the period of significance, the privately owned land within the views presents a potential for changes that could impact the historic views. The areas of concern include those in Figure 4-7 where the privately owned land (gray) overlaps the historic views (two shades of purple).



Figure 4- 8: View of Delta-01 from I-90 facing northwest, note the cell tower in the right portion of the image, June 2009 (source: QEA)



Figure 4- 9: View from Delta-01 facing south on an overcast day, June 2009 (source: QEA 3373)



Figure 4- 10: View from the horseshoe pits facing southeast on an overcast day, June 2009 (source: QEA 3396)



Figure 4- 11: "Wall Drug" Billboard visible from Delta-01, facing west, June 2009 (source: QEA 3348)

Vegetation Landscape Analysis, Delta-01

Vegetation at Delta-01 remains much the same as it was during the period of significance, with one exception. During the time that the facility was active, the U.S. Air Force kept a large portion of the area within the security fencing clear of all vegetation through applications of herbicides. Today herbaceous species are encroaching into the gravel bases surrounding some of the landscape features.

Buildings and Structures Analysis, Delta-01

From a landscape perspective, the buildings and structures at Delta-01 remain unchanged from their historic conditions. The Buildings and Structures Analysis section provides detailed information regarding the integrity of the buildings.

Small Scale Features Landscape Analysis, Delta-01

Delta-01 contains a number of small scale landscape features that contribute to the integrity of the historic site. Each feature is described and illustrated in Chapter 3: Existing Conditions and Affected Environment. The features are enumerated in Table 4-1 indicating whether they contribute to the integrity of the historic landscape, and an explanation of the rationale used to determine their status.

Table 4-1: Delta-01 Landscape Small Scale Features

Small Scale Features	Contributing or Non-contributing	Rationale
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	*Contributing*	Part of the facility operations during the period of significance, constructed in 1963. Deactivated in the early 1970s.
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	*Contributing*	Part of the facility operations during the period of significance, constructed in 1963. Deactivated circa 1987-1988.
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	*Contributing*	Part of the facility operations during the period of significance, installed in 1976.
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	*Contributing*	Part of the facility operations during the period of significance, installed in 1968.
Cathodic protection rectifier (HS 110, IDLCS 100485)	*Contributing*	Part of the facility operations during the period of significance, installed in 1963.
Two sewage lagoons (HS 108, IDLCS 100486)	*Contributing*	Part of the facility operations during the period of significance.
Helicopter pad (HS 109, IDLCS 100485)	*Contributing*	Part of the facility operations during the period of significance.
ICBM super-high frequency satellite terminal antenna (ISST) (HS 126, IDLCS 754345)	*Contributing*	Installed circa1992, the antenna was installed when the missile sites were being deactivated in Ellsworth's 67th Strategic Missile Squadron. This feature represents how the site was still evolving, even as it was being deactivated.
Television satellite dish (HS 121, IDLCS 398298)	*Contributing*	Part of the facility operations during the period of significance. Installed circa 1987-88.
HICS	*Contributing*	Part of the facility operations during the period of significance.
Security fencing (HS 113, IDLCS 287263)	*Contributing*	Part of the facility operations during the period of significance.
Sewage lagoon fencing / Livestock fencing (HS 125, IDLCS 754342)	*Contributing*	Part of the facility operations during the period of significance.
Cattle-guard (HS 129, IDLCS 754354)	*Contributing*	Part of the facility operations during the period of significance.
Electric fence	*Non-contributing*	Erected by the National Park Service after the end of the period of significance.
Historic signage (HS 117, IDLCS 354856)	*Contributing*	Part of the facility operations during the period of significance.

Small Scale Features (cont.)	Contributing or Non-contributing	Rationale
Protective bollards (HS 116, IDLCS 354857)	*Contributing*	Part of the facility operations during the period of significance.
Access road and parking area (HS 119, IDLCS 390289)	*Contributing*	Part of the facility operations during the period of significance.
Well and water tanks (HS 118, IDLCS 354851)	*Contributing*	Part of the facility operations during the period of significance.
Flagpole (HS 120, IDLCS 398270)	*Contributing*	Part of the facility operations during the period of significance.
Basketball goal (HS 112, IDLCS 287625)	*Contributing*	Installed for use by missileers during the period of significance.
Volleyball court (HS 115, IDLCS 287266)	*Contributing*	Installed for use by missileers during the period of significance.
Horseshoe court (HS 114, IDLCS 287261)	*Contributing*	Installed for use by missileers during the period of significance.
Code burner (HS 111, IDLCS 287264)	*Contributing*	Part of the facility operations during the period of significance.
Interpretive wayside	*Non-contributing*	Installed by the NPS after the end of the period of significance.
Portable toilet	*Non-contributing*	Installed by the NPS after the end of the period of significance.
Concrete pad, transformer, and generator	*Non-contributing*	Installed by the NPS after the end of the period of significance.

Summary of Integrity Delta-01

During the time that Delta-01 served as an active Minuteman Missile installation, the facility changed very little related to its original configuration and construction. Most changes were limited to equipment upgrades in response to new technology and routine maintenance. Early changes at Delta-01 included the construction of a freestanding vehicle storage building in 1968 to replace the earlier garage in the wing of the support building. A helicopter pad and additional sewage lagoon were added to the facility in 1970.

Between 1971 and 1973, aspects of the facility were modified when Ellsworth replaced its arsenal of Minuteman Ib missiles with Minuteman II. The changes associated with this conversion were mainly contained within the missiles themselves and were not apparent on the landscape.

Delta-01 remains largely the same as it was when it was deactivated. Care has been taken to keep as much of the original materials on the site. Modifications made at Delta-01 related to its use interpretation as a historic site include installation of an interpretive wayside near the entrance gate in the security fence, and installation of a portable toilet. Deactivation activities and conversion of the site to a unit of the National Park Service did not diminish its ability to convey its historic use and appearance as a Minuteman Missile facility used by the Air Force from 1963 to 1993.

The Delta-01 site retains integrity of location, design, setting, feeling, association, materials and workmanship. The facility remains in its historic location and layout and the surrounding features continue to reflect their historic characteristics. The setting and feeling of the property are intact, as the facility retains the main contributing features from the period of significance and its remote surroundings continue to relay a feeling of isolation that was experienced by the missileers. The association of the property with an active Minuteman Missile program is no longer integral to the facility however, the interpretation of the historic activities helps to keep a strong connection with the historic operations. Although the removal of the other Minuteman Missile installments has impacted the integrity of the overall cold war landscape of the northern Great Plains, the interpretation of their former existence helps visitors to understand the broader context of the program. All of the primary historic buildings, structures, and landscape features remain and are in good condition, therefore integrity of materials and workmanship remains intact.

Landscape Analysis, Delta-09

Spatial Organization Landscape Analysis, Delta-09

The arrangement of the buildings and landscape features on the site at Delta-09 remains intact, reflecting the Air Force layout of the site. Only minor changes have occurred since the period of operation. These comprise the addition of elements on the site by the National Park Service including the glass viewing enclosure at the missile silo and a portable toilet structure inside the northwest corner of the security fence. Neither of these additions has notably altered the overall spatial organization of the property.



Figure 4- 12: Oblique aerial view of Delta-09 and the surrounding area facing southwest during the period of significance, no date (source: Library of Congress, Prints and Photographs Division, Historic American Engineering Record, Reproduction Number HAER SD-50-C-1)



Figure 4- 13: View of Delta-09 from Pennington County Road T512, facing west, June 2009 (source: QEA 3115)

Land Use Landscape Analysis, Delta-09

Within the security fence at Delta-09, land use has changed from an active missile Launch Facility to an interpretive site. The property no longer contains an active Minuteman Missile prepared to launch at any moment. There is no longer a need to maintain the facilities in preparation for launching a missile, eliminating the presence of maintenance workers, their vehicles, and their activities. Security needs at the site have changed as well. They are now related to protecting the historic resources, whereas historically security focused on military defense. The area surrounding the missile silo was a potential blast zone during the period of significance however, that did not affect the day to day appearance of the landscape.

Land use beyond the security fence appears to be unchanged since the period of significance. The majority of the surrounding property is utilized for ranch livestock grazing, and Interstate Highway 90 continues to provide a major transportation link that is visible to the north and northeast of the site.

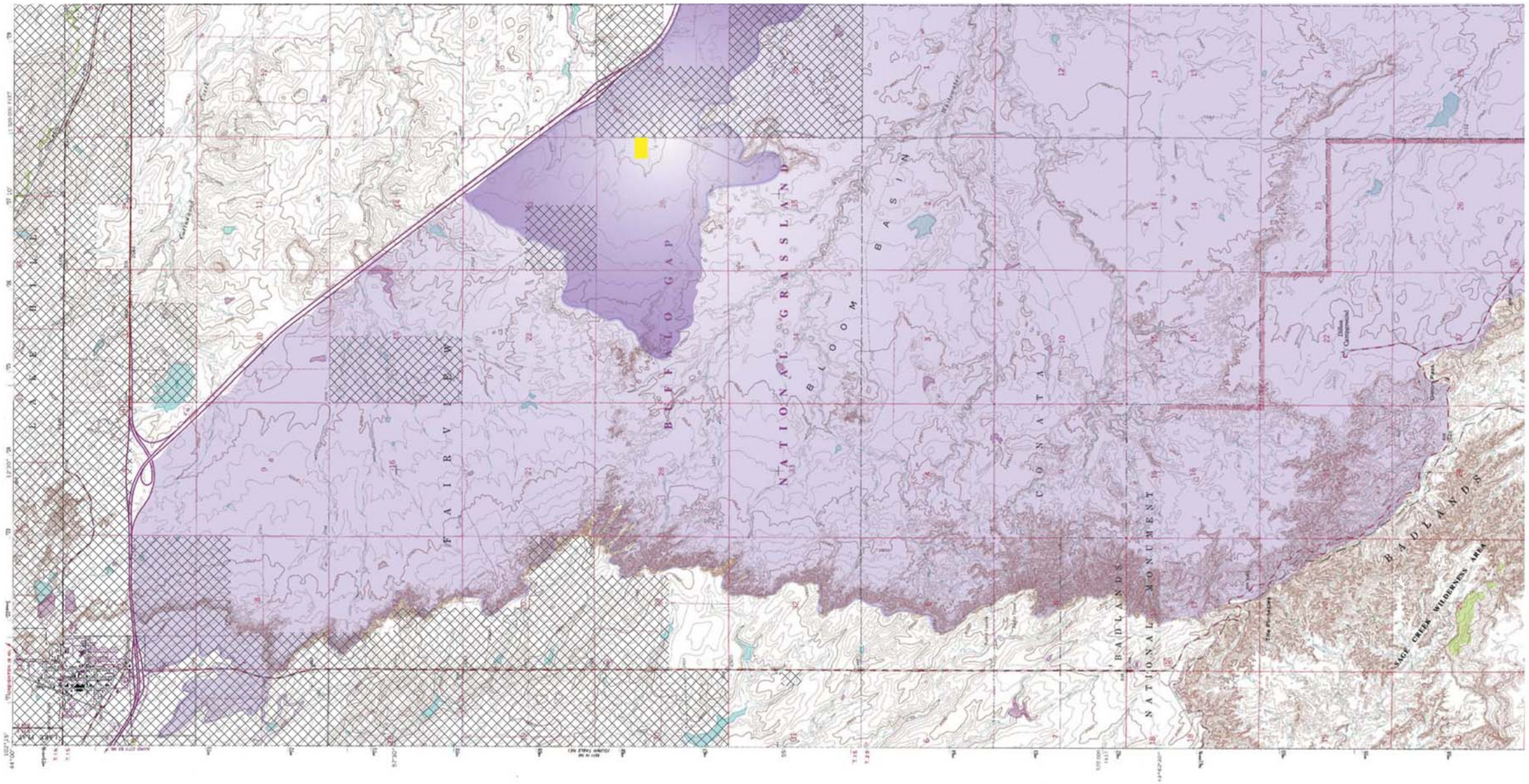
A parcel of property immediately adjacent to the eastern boundary of Delta-09 is privately owned, as are several large tracts that are within the historic views of the facility. Since there are no land use controls that affect private property in the area, the use of these parcels may conceivably change at any time, potentially impacting the historic views from Delta-09. Figure 4-14 illustrates the views and privately owned land in the vicinity of Delta-09. Areas where the privately owned land overlaps foreground

views from Delta-09 are those most vulnerable to impacts from potential changes in land use.

The remainder of the landscape within view of Delta-09 is publicly owned as part of Buffalo Gap National Grassland and Badlands National Park. Since it is federally owned property, any proposed changes to land use would require consideration of the potential impacts that the alterations would have on Delta-09, thereby providing a high level of confidence that the historic land use will remain intact in the foreseeable future.

Next page: Figure 4- 14: Delta-09 Existing Views and Ownership

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA



DELTA-09 EXISTING VIEWS & OWNERSHIP

0 1000 3000 5000 7000 9000

APPROXIMATE SCALE (FEET)

NORTH

MAP KEY

- Privately Owned Land
- Delta-09 Foreground Views
- Delta-09 Background Views
- Approximate Location of Delta-09

SOURCES

USGS MAP
QEA FIELD INVESTIGATIONS, JUNE 2009

QUINN EVANS
ARCHITECTS

Circulation Landscape Analysis, Delta-09

Patterns of circulation on the site remain the same as they were during the period of significance. The locations and types of pavement of vehicular routes have not changed. Visitor parking is provided on the access drive outside the security fence, avoiding the potential impacts that could be associated with providing parking within the core of the Launch Facility where visitor vehicles could distract from the historic character of the site.

Topography and Views Landscape Analysis, Delta-09

Topography at Delta-09 was altered for the initial implementation of the facility on the site. The alterations remain apparent on the landscape retaining the historic topography of the site. Beyond the borders of Delta-09, there have been adjustments to the grades of the site access drive and a drainage ditch along the outside of the fence that occurred after the deactivation of the facility. No major alterations to the topography within view of the facility have occurred since the site was activated in 1963.

Beyond the boundaries of Delta-09, the broader landscape is relatively level, sloping gradually down from the north to the south. Views to the west, south and southeast present a grassland landscape that extends towards badland geological formations at the horizon (see Figures 4-15 through 4-17). To the north and northeast, a rolling ridge and I-90 provide boundaries for views from Delta-09 (see Figures 4-18 through 4-21).



Figure 4- 15: View to the east from Delta-09, June 2009 (source: QEA 3508)



Figure 4- 16: View to the South from the access drive at Delta-09 on an overcast day, June 2009 (source: QEA 3498)



Figure 4- 17: View to the southeast from the access drive at Delta-09, June 2009 (source: QEA 3116)



Figure 4- 18: View to the west including the northwest portion of Delta-09, and the grassland surrounding the site, the arrow indicates the portable toilet at Delta-09, June 2009 (source: QEA 3139)



Figure 4- 19: View to the east from inside the security fence at Delta-09, the highway is visible when on site, the arrow indicates a truck on the highway, June 2009 (source: QEA 3534)



Figure 4- 20: View to the northeast from Delta-09, the eastern azimuth marker is indicated by the arrow, and a truck can be seen on the highway on the horizon, June 2009 (source: QEA 3516)



Figure 4- 21: View to the northeast from the access drive at Delta-09, the orange line is the location of I-90, which can be seen from the site, June 2009 (source: QEA 3121)

Similar to Delta-01, the views surrounding Delta-09 present a vast grassland. At Delta-09 these views extend to badland geological formations to the west, south and southeast, providing visual reminders of the amazing natural landscape in the region. While the views at Delta-09 are generally unchanged since the period of significance, the privately owned land within the views presents a potential for changes that could impact the historic views. Figure 4-14 illustrates the views and privately owned land in the vicinity of Delta-09. Areas where the privately owned land overlaps foreground views from Delta-09 are most vulnerable to impacts from potential changes in land use.

Vegetation Landscape Analysis, Delta-09

Vegetation at Delta-09 remains essentially the same as it was during the period of significance, with one exception. During the time that the facility was active, the U.S. Air Force kept the entire area within the security fencing clear of all vegetation through applications of herbicides. Today herbaceous species are encroaching into the gravel in some areas.

Buildings and Structures Analysis, Delta-09

From a landscape perspective, the only significant change to the structures at Delta-09 is the addition of the viewing enclosure at the missile launcher. During the period of significance the peaked glass enclosure was not present. Also, the silo doors were closed the majority of the time and the missile could not be viewed. The addition of the viewing enclosure was made in order to enhance the interpretation of the facility and does not notably impact the integrity of the historic landscape. The Buildings and Structures Analysis section provides detailed information regarding the integrity of the buildings.

Small Scale Features Analysis, Delta-09

Delta-09 contains a number of small scale landscape features that contribute to the integrity of the historic site. Each feature is described and illustrated in Chapter 3: *Existing Conditions and Affected Environment*. The features are enumerated in Table 4-2 indicating whether they contribute to the integrity of the historic landscape, and an explanation of the rationale used to determine their status.

Table 4-2: Delta-09 Small Scale Landscape Features

Small Scale Features	Contributing or Non-contributing	Rationale
Glass viewing enclosure	*Non-contributing*	Installed by NPS after the end of the period of significance.
Training model of missile	*Non-contributing*	Installed in the launch tube in 2001. Part of the NPS interpretive program at the site.
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	*Contributing*	Part of the facility operations during the period of significance. Installed 1989.
Hardened UHF antenna (HS 904, IDLCS 100491)	*Contributing*	Part of the facility operations during the period of significance. Installed circa1968.
Cathodic protection rectifier (HS 912, IDLCS 390310)	*Contributing*	Part of the facility operations during the period of significance. Installed circa1982-83.
Two azimuth markers (HS 905, IDLCS 100492)	*Contributing*	Part of the facility operations during the period of significance.
Two HICS marker posts (HS 907, IDLCS 345796)	*Contributing*	Part of the facility operations during the period of significance.
Security fence (HS 906, IDLCS 295903)	*Contributing*	Part of the facility operations during the period of significance.
Light posts (HS 908, IDLCS 354853)	*Contributing*	Part of the facility operations during the period of significance.
Bollard (HS 909, IDLCS 354859)	*Contributing*	Part of the facility operations during the period of significance.
Helipad & Markers (HS 910, IDLCS 354855)	*Contributing*	Part of the facility operations during the period of significance.
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	*Contributing*	Part of the facility operations during the period of significance.
Antenna piers (HS 913, IDLCS 400831)	*Contributing*	Part of the facility operations during the period of significance.
Transporter erector pylons (HS 914, IDLCS 412538)	*Contributing*	Part of the facility operations during the period of significance.
Launch facility warning signs (HS 915 IDLCS 754362)	*Contributing*	Part of the facility operations during the period of significance.
Culvert	*Non-contributing*	Installed by NPS after the end of the period of significance.
Drainage ditch	*Non-contributing (verify)*	Regraded and lined with dense gravel by the NPS after the end of the period of significance.
Portable toilet	*Non-contributing*	Installed by NPS after the end of the period of significance.

Summary of Integrity Delta-09

During the time that Delta-09 served as an active Minuteman Missile installation, the facility changed very little related to its original configuration and construction. Most changes were limited to equipment upgrades in response to new technology and routine maintenance. Between 1971 and 1973, aspects of the facility were modified when Ellsworth replaced its arsenal of Minuteman Ib missiles with Minuteman II. The changes associated with this conversion were mainly contained within the missiles themselves and were not apparent on the landscape. The same is true for the removal of the missile in 1991.

Slight modifications have been made to Delta-09 to prepare it for interpretation as a static display. The launcher closure has been permanently fixed in a partially open position and a glass viewing enclosure was installed over the opening in 2001. A training model of a Minuteman II missile was installed in the launch tube in 2001. The viewing enclosure and training missile are noncontributing features of the missile launcher. Deactivation activities and conversion of the site to a unit of the National Park Service did not diminish its ability to convey its historic use and appearance as a Minuteman Missile facility used by the Air Force from 1963 to 1993.

The Delta-09 site retains integrity of location, design, setting, feeling, association, materials and workmanship. The facility remains in its historic location and layout and the surrounding features continue to reflect their historic characteristics. The setting and feeling of the property are intact, as the facility retains the main contributing features from the period of significance and its remote surroundings continue to relay a feeling of isolation that was experienced by the missileers. The association of the property with an active Minuteman Missile program is no longer integral to the facility however, the interpretation of the historic activities helps to keep a strong connection with the historic operations. With the exception of the active missile at Delta-09, all of the historic buildings, structures, and landscape features are extant, therefore integrity of materials and workmanship remains intact. Although the removal of the other Minuteman Missile installments has impacted the integrity of the overall cold war landscape of the northern Great Plains, the interpretation of their former existence helps visitors to understand the broader context of the program.

Building Analysis, Delta-01

During the time that Delta-01 served as an active Minuteman Missile installation, frequent upgrades of building elements and systems occurred. As an active military installation periodic updates to kitchen, bathroom, and bedroom facilities were necessary. In addition, a freestanding vehicle storage building was constructed in 1968 to replace the earlier garage in the wing of the support building. The structures at Delta-01, including the support building and launch control center, continued to evolve throughout their occupation by the missile squadron.

Between 1971 and 1973, aspects of the facility were modified when Ellsworth replaced its arsenal of Minuteman Ib missiles with Minuteman II. The changes associated with this conversion were mainly contained within the missiles themselves and were not apparent on the landscape.

Delta-01 remains largely the same as it was when it was deactivated. Care has been taken to keep as much of the original materials on the site. Modifications made at Delta-01 related to its interpretation as a historic site include the laying of carpet over the existing flooring to be used by visitors and to protect the historic flooring underneath. Deactivation activities and conversion of the site to a unit of the National Park Service did not diminish its ability to convey its historic use and appearance as a Minuteman Missile facility used by the Air Force from 1963 to 1993. Aside from the temporary carpets, every architectural element and furnishing within the buildings are character defining features to the site.

The Delta-01 buildings retain integrity of location, design, setting, feeling, association, materials and workmanship. The buildings remain in their historic location and layout and continue to reflect their historic characteristics. The setting and feeling of the buildings are intact, as the facility retains the main character defining features from the period of significance as they were used by the missileers. The association of the property with an active Minuteman Missile program is no longer integral to the facility; however, the interpretation of the historic activities helps to keep a strong connection with the historic operations. All of the primary historic buildings and structures remain and are in good condition, therefore integrity of materials and workmanship remains intact.

Table 4-3: Delta-01 Character Defining Building Features

Building Character Defining Features (EXTERIOR)	Contributing or Non-contributing	Rationale
One-story rectangular ranch-style building form and orientation	*Contributing*	Original building form as constructed in 1963.
One-story detached rectangular vehicle heated storage building form and orientation	*Contributing*	Original building form as constructed in 1968.
8" thick reinforced concrete foundation wall, painted brown and off-white	*Contributing*	Original foundation as constructed in 1963.
Pre-fabricated steel siding, wood-grained embossed, 8" exposure with corner trim and window surrounds, pre-finished tan color	*Contributing*	Installed to replace the original asbestos cement shingle siding in the mid 1980s.
Vinyl-clad wood one-over-one double hung windows and aluminum storm windows.	*Contributing*	Installed circa 1983.
Hollow metal doors and frames, with ¼" wire glass in doors with vision panels, and hardware; doors painted tan with dark brown frames.	*Contributing*	Installed circa 1976; hardware, in storage, was replaced by the NPS.
Concrete door stoops, painted white on sides, and concrete and metal door stops, painted dark brown	*Contributing*	Present during the period of significance.
Shallow sloped gable roof covered with timber-blend 2-tab asphalt shingles; dark brown aluminum K-style gutters, soffit and fascia panels, and trim strips, and tan aluminum downspouts with dark brown concrete splash blocks	*Contributing*	Originally installed circa 1983, replaced in-kind by the NPS in 2008.
All attached utilities, including: Pipes, brackets, vents, louvers and hoods, electrical conduit, wind vane, light fixtures, etc., with the exception of utilities associated with the installation of the fire suppression system in 1999/2000.	*Contributing*	All present and part of facility operations during the period of significance.

Building Character Defining Features (INTERIOR)	Contributing or Non-contributing	Rationale
Building floor plan, including security/service area at the east, recreation/common areas in the center, and double-loaded bedroom corridor at the west end.	*Contributing*	Original building form as constructed in 1963 with modifications during the period of significance.
Historic flooring material types: concrete, marbleized vinyl asbestos tile, marbleized asphalt tile, circa 1980s patterned carpet.	*Contributing*	Originally installed during the period of significance; some materials (e.g. carpets) replaced in-kind by the NPS
Dark mauve carpet runners	*Non-Contributing*	Installed by the NPS to protect carpets from visitor use.
Historic wall and ceiling materials: drywall, vinyl wood-grained or ceramic tile wainscot, wood paneling, fabric-covered or tegular acoustic tile, rubber base molding; extant color scheme on all finishes	*Contributing*	Originally installed during the period of significance; some materials (e.g. drywall and paint) replaced in-kind by the NPS.
Solid core wood doors, painted or stained/varnished and some with vision glass panels; extant historic hardware; expanded metal gate painted white	*Contributing*	Originally installed during the period of significance.
Window treatments: tinted plastic roller shades, vinyl vertical blinds, vertical fabric curtains on retractable rods	*Contributing*	Originally installed during the period of significance.
Fixtures: Wood shelving, security counter and equipment, elevator equipment, shaft and cab, entertainment console, kitchen cabinets, countertops, and equipment, bathroom fixtures and accessories, bedroom furniture, etc.	*Contributing*	Originally installed during the period of significance.
Mechanical systems	*Contributing*	Originally installed during the period of significance.
Extant generator (abandoned)	*Contributing*	Originally installed during the period of significance.
Water treatment equipment (abandoned)	*Contributing*	Originally installed during the period of significance.

Building Character Defining Features (LAUNCH CONTROL CENTER)	Contributing or Non-contributing	Rationale
Vestibule: concrete floor, walls, ceiling	*Contributing*	Originally constructed in 1963.
Decorative paintings in vestibule	*Contributing*	Present during the period of significance
Blast door and stop	*Contributing*	Originally constructed in 1963.
Launch control center structure: Concrete surface, steel interior liner, and associated equipment (shock isolators, water tank, utilities, etc).	*Contributing*	Originally constructed in 1963.
Launch control center interior finishes and fixtures: carpeted floors, solid and perforated metal acoustic panels with sound absorption fabric panels on ceilings and walls, latrine, modular bed, launch equipment, etc.	*Contributing*	Originally installed during the period of significance.

Building Analysis, Delta-09

During the time that Delta-09 served as an active Minuteman Missile installation, the facility changed very little related to its original configuration and construction. Most changes were limited to equipment upgrades and basic maintenance. Between 1971 and 1973, aspects of the facility were modified when Ellsworth replaced its arsenal of Minuteman Ib missiles with Minuteman II missiles. The changes associated with this conversion were mainly contained within the missiles themselves and were not apparent on the landscape. The same is true for the removal of the missile in 1991.

Slight modifications have been made to Delta-09. The launcher blast door was welded in a partially open position as compliance for the START treaty, and a glass viewing enclosure was installed over the opening in 2002 for interpretation purposes. A training model of a missile was installed in the launch tube in 2001. The viewing enclosure and training missile are noncontributing features of the missile launcher. Deactivation activities and conversion of the site to a unit of the National Park Service did not diminish its ability to convey its historic use and appearance as a Minuteman Missile facility used by the Air Force from 1963 to 1993.

The Delta-09 site retains integrity of location, design, setting, feeling, association, materials and workmanship. The silo and associated structures remain in their historic location and layout and continue to reflect their historic characteristics. The setting and feeling of the structures are intact, as the facility retains the main contributing features from the period of significance. The association of the property with an active

Minuteman Missile program is no longer integral to the facility; however, the interpretation of the historic activities helps to keep a strong connection with the historic operations. With the exception of the active missile in the silo, all of the historic elements of the silo and structures are extant; therefore integrity of materials and workmanship remains intact.

Table 4-4: Delta-09 Character Defining Building Features

Character Defining Building Features	Contributing or Non-contributing	Rationale
Glass viewing enclosure	*Non-contributing*	Installed by the NPS after the end of the period of significance.
Training model of missile	*Non-contributing*	Installed in the launch tube in 2001. Part of the NPS interpretive program at the site.
Concrete retaining walls	*Contributing*	Originally constructed in 1963.
Concrete launch apron and concrete/steel launch closure	*Contributing*	Originally constructed in 1963.
Concrete and steel closure tracks	*Contributing*	Originally constructed in 1963.
Underground concrete launch facility support building (vault) and associated equipment	*Contributing*	Originally constructed in 1963.
Steel personnel access hatch and steel pylons	*Contributing*	Originally constructed in 1963.
Concrete launch facility silo	*Contributing*	Originally constructed in 1963.

Chapter 5: Management Philosophy and Management Issues

Chapter 5: Management Philosophy and Issues

Cultural Landscape and Structures Management Philosophy

The publication, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, provides professional standards and guidance for treatments to cultural landscapes and structures listed in or eligible for the National Register of Historic Places. The document defines four types of treatment for historic landscapes and structures, including preservation, restoration, reconstruction, and rehabilitation.[1] Each of the philosophies is described herein and discussed in relation to the historic landscape at Minuteman Missile National Historic Site.

Preservation and rehabilitation have been identified as appropriate management philosophies for the cultural landscapes and structures at Delta-01 and Delta-09. *Chapter 6, Treatment Alternatives*, describes two approaches for managing the historic landscapes at Minuteman Missile. One of the alternatives (Treatment Alternative 1) applies preservation as an overall treatment philosophy for the cultural landscapes and structures at Delta-01 and Delta-09. The second treatment alternative (Treatment Alternative 2) uses an overall management philosophy of rehabilitation. A historic core has been defined for each site (see Figures 5-1 and 5-2). The historic core is the area within the historic boundary that includes the greatest concentration of historic resources. Within the historic boundary at each site, preservation is the management philosophy applied to the buildings and landscapes for both treatment alternatives.

[1] Birnbaum, Charles A. and Christine Capella Peters, 1996. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes. Washington DC: Department of the Interior, National Park Service, 3-5.

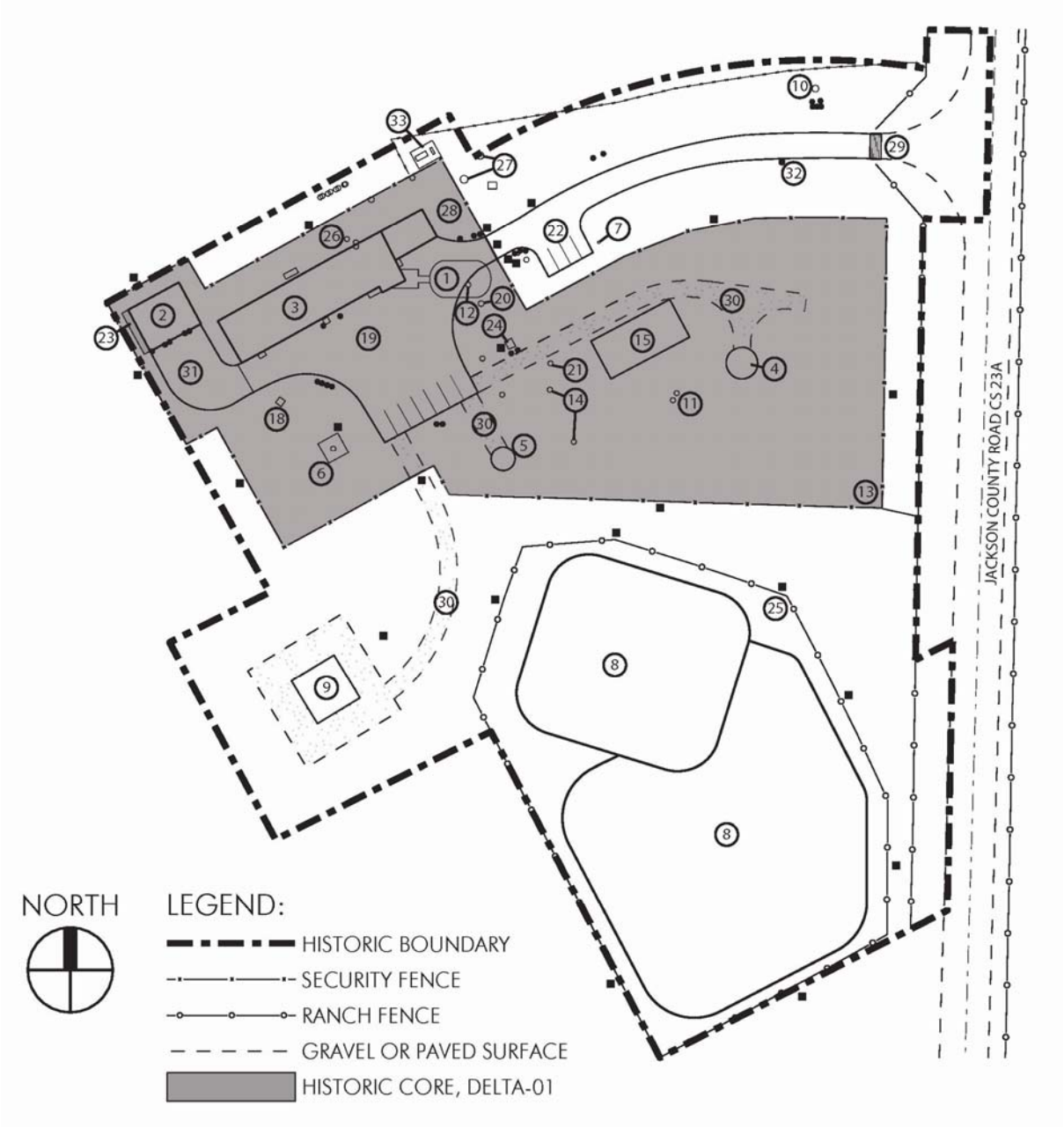


Figure 5- 1: Delta-01 Historic Core (source: National Mead & Hunt, Inc., modified by Quinn Evans | Architects, 2009)

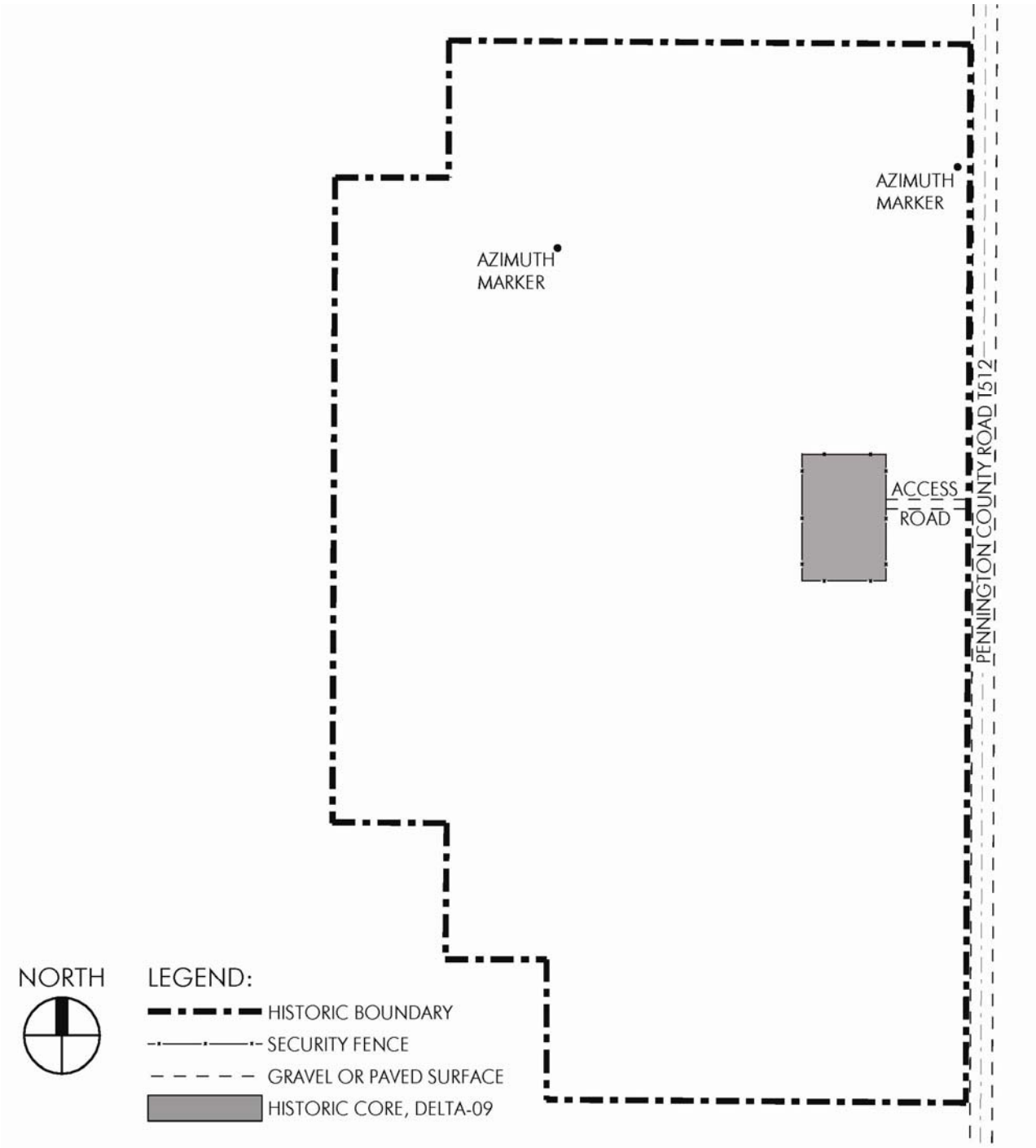


Figure 5- 2: Delta-09 Historic Core (source: Mead & Hunt, Inc., modified by Quinn Evans Architects, 2010)

Preservation

The preservation of historic landscapes and structures involves applying measures to sustain the *existing* form, integrity, and materials of a historic property. This approach focuses upon stabilizing and protecting extant historic resources, rather than replacing missing elements. It is appropriate when a historic property is essentially intact and does not require extensive repair or replacement and when continuing or new use does not require additions or alterations. Depiction at one particular period of time is generally not appropriate with a landscape preservation philosophy, as this would often require the removal of resources that relate to other significant time periods.[2]

Preservation has been selected as the most appropriate management approach for the landscapes within the historic cores of Delta-01 and Delta-09. The historic core of each site is defined by the area within the security fence. The Preferred Alternative applies a preservation philosophy to the areas within the historic cores, and a rehabilitation philosophy to the landscapes outside the historic cores, in order to provide necessary accommodations for visitors.

Preservation is also the most appropriate management approach for the historic buildings and structures at Delta-01 and Delta-09. These resources have, with minor exceptions, been preserved exactly as they were when the Ellsworth Air Force Base Minuteman Missile wing was decommissioned in 1993. Those minor exceptions included the removal of some classified equipment, installation of a fire suppression system, the substitution of a training model of a missile for the active ICBM in the silo, and the installation of a viewing enclosure over the missile silo. The intention for the buildings and structures at Delta-01 and Delta-09 is to preserve them in as authentic a condition as possible so that visitors can experience the buildings as they were during their active use. Any alterations or additions necessary to their interpretive and operational functions should have minimal impact on the historic resources. Preservation is an appropriate treatment for the buildings and structures because of the very high integrity of the sites and their intended interpretive use.

Restoration

Restoration is the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period in time. This includes reconstruction of missing features from the restoration period, and removal of features from all other periods. The approach can be considered only when the property's significance during a particular period of time outweighs the loss of extant elements from other historical periods; and when there is substantial physical and documentary evidence for the work; and when contemporary alterations and additions are not planned.[3]

[2] Ibid., 17-18.
[3] Ibid., 89-90.

At Minuteman Missile restoration is not considered the most appropriate management philosophy. At Delta-09, the removal of the active missile and its replacement with a deactivated training model of a missile, the partial opening of the launcher closure, and the construction of the viewing enclosure are all changes that have been made to comply with the provisions of the START arms-reduction treaty and to accommodate the use of the property as an interpretive site. Restoration would require reversal of these changes, which would go against the terms of the START treaty, and would not be acceptable for the current use as a national historic site. Also, the need to provide additional parking and minimal comfort facilities for visitors in the future is not compatible with restoration as a management philosophy.

Reconstruction

Reconstruction is the act or process of using new construction to depict a non-surviving site, landscape, building, structure, or object as it appeared at a specific period of time in its historic location. The approach is appropriate only when the property's significance during a particular period of time outweighs the potential loss of extant features that characterize other historical periods. In addition, there must be substantial physical and documentary evidence for the work, and the work must be clearly identified as a contemporary re-creation.[4]

At Minuteman Missile National Historic Site, the significant features relate to one historic period and adequate documentary evidence exists to reconstruct the property accurately. However, the facility should never be reconstructed, as it is now a national historic site and no longer a military installation. Also, contemporary needs require some alterations to the landscape.

Rehabilitation

The act or process of rehabilitation allows repairs, alterations, and additions necessary to enable a compatible use for a property, as long as the portions or features which convey the historical, cultural, or architectural values are preserved. This approach is appropriate when depiction at one particular period of time is not appropriate; repair or replacement of deteriorated features is necessary; and alterations or additions are needed for a new use.[5]

Rehabilitation is an appropriate management philosophy for the cultural landscapes at Delta-01 and Delta-09. Both sites include historic cores where preservation is the most appropriate approach to landscape management. Beyond the historic cores, rehabilitation

[4] Ibid., 127-129.
[5] Ibid., 47-48.

of the landscape may be appropriate in order to provide facilities for visitors including parking, interpretive waysides, and comfort facilities. Treatment Alternative 2 utilizes this philosophy to provide a balance between preservation and visitor services.

Management Issues

Management concerns for the historic resources at Minuteman Missile National Historic Site are summarized in this section. At a broad scale, management issues are described that affect the entire park, as well as the areas between the two units of the park. At a more detailed level, management issues are described that relate to the resources at Delta-01 and Delta-09.

Management Issues Related to the Overall Park

- Resources related to the Minuteman program exist beyond the boundaries of Delta-01 and Delta-09. The park needs guidance on whether or not these resources should be interpreted as part of the Minuteman Missile story.
- The National Park Service needs guidance for developing an interpretive program that is compatible with the historic resources including an approach for installing interpretive media on the landscape at Delta-01 and Delta-09.

Management Issues Related to Delta-01

Spatial Organization (Delta-01)

- The integrity of the spatial organization of the historic landscape needs to be protected from incremental changes that could reduce integrity.

Land Use (Delta-01)

- The park needs a policy for addressing the use of the recreational area (basketball hoop, volleyball and horseshoe courts) by visitors.
- A clear distinction between the historic core and any areas developed for visitor use needs to be made. The cattle-guard and security fence provide visual indication of the historic core. New development for visitor use should be kept outside the security fence.

Circulation (Delta-01)

- Visitor vehicular circulation needs to be improved for personal vehicles, busses, recreational vehicles and a shuttle van.
- Visitor parking needs to be improved.

- A universally accessible route needs to be provided for visitors on site.
- The road from the highway exit to the site contains large potholes and is not well maintained. The road and its maintenance need to be improved.

Topography and Views (Delta-01)

- Significant views to and from the site need to be protected from potential impacts.
- A portion of land within the significant views at the site is not owned by the National Park Service. Adjacent land that is privately owned is especially vulnerable to change that could impact the historic views. Adjacent land that is federally owned is less vulnerable to change, due to the requirement of Section 106 review, however, the lack of management agreements to protect these views allows for potential impacts.
- Puddling of water along the south elevation of the main building needs to be eliminated.

Vegetation (Delta-01)

- Within the historic core, the park needs an approach for addressing vegetation that is encroaching into the gravel areas surrounding landscape features.

Small Scale Features (Delta-01)

- The electric fence is not historic and could provide a hazard to visitors. The electric fence was added to the site to prevent livestock from damaging cars in the parking area. A livestock barrier that is safe and visually unobtrusive needs to be provided in place of the electric fence.

Buildings and Structures (Delta-01)

- The integrity of the historic building fabric needs to be protected from excessive wear and tear due to increased use by visitors.
- The park needs guidance on routine maintenance and replacement of deteriorated historic fabric, especially historic materials that are no longer readily available.
-

Management Issues Related to Delta-09

Spatial Organization (Delta-09)

- The integrity of the organization of the historic landscape needs to be protected from incremental changes.

Land Use (Delta-09)

- A clear distinction between the historic core and any areas developed for visitor use needs to be made. The fence provides a natural cue to visitors to indicate the historic core. New facilities should also avoid intruding between the azimuth markers and the fenced area.

- The NPS needs guidance regarding whether or not to add a visitor contact station at the site.

Circulation (Delta-09)

- Visitor vehicular circulation needs to be improved (for personal vehicles, busses, recreational vehicles and a shuttle van).
- Visitor parking needs to be improved.
- A universally accessible route needs to be provided for visitors on site.

Topography and Views (Delta-09)

- Significant views need to be protected from potential impacts.
- A portion of land within the significant views at the site is not owned by the National Park Service. Adjacent land that is privately owned is especially vulnerable to change that could impact the historic views. Adjacent land that is federally owned is less vulnerable to change, due to the requirement of Section 106 review, however, the lack of management agreements to protect these views allows for potential impacts.
- Erosion at the south side of the historic core has caused deterioration and erosion control measures need to be applied.

Vegetation (Delta-09)

- Within the historic core, the park needs an approach for addressing vegetation that is encroaching into the gravel areas surrounding landscape features.
- Beyond the historic core, the park needs an approach for addressing vegetation to ensure that it continues to reflect its historic appearance.

Buildings and Structures (Delta-09)

- The integrity of the historic building fabric needs to be protected from excessive wear and tear due to increased use by visitors. Although visitors do not enter the structures at this site, their exploration of the exterior features is not monitored and therefore, could lead to impacts.
- The park needs guidance on routine maintenance and replacement of deteriorated historic fabric, especially historic materials that are no longer readily available.

Chapter 6: Treatment Alternatives

Chapter 6: Treatment Alternatives

Overview

Recommendations for the treatment of the historic landscapes and structures within Minuteman Missile National Historic Site are provided in this chapter. The *General Management Plan/ Environmental Impact Statement* (GMP/EIS) for Minuteman Missile National Historic Site provides clear direction for future management of the park, including buildings and sites. The GMP/EIS thoroughly evaluated four treatment alternatives that included use of the buildings and sites associated with the park. The preferred alternative from the GMP/EIS provides specific guidance for the programming of the buildings and landscapes at Delta-01 and Delta-09, and serves as a foundation for the HSR/CLR/EA. Possibilities for treatment of the buildings and landscapes were scrutinized according to the GMP/EIS preferred alternative. This led to the elimination of HSR/CLR/EA alternatives that did not completely meet the GMP/EIS requirements and the ultimate evaluation of only one viable action alternative as part of the HSR/CLR/EA.

Recommendations for Delta-01 and Delta-09 were developed with careful consideration of how the two sites relate to each other, and include proposals for enhancing visitors' understanding of how the two sites functioned together. To simplify their presentation, the recommendations for the resources related to Delta-01 and Delta-09 are provided separately.

Two alternative treatments are presented for the buildings and historic landscapes at Delta-01 and Delta-09. The treatment alternatives include the current management (no action alternative) and the preferred action alternative. The current management / no action alternative reflects the current use of the landscape and provides a baseline for evaluation of potential impacts from the preferred action. The current management / no action alternative is presented first, followed by an overview of the goals and objectives for the preferred action alternative.

Following the descriptions of the treatment alternatives, a quantified summary of the extent to which the alternatives meet the project objectives is provided. Next, a summation of the environmental impacts associated with each alternative is presented in the section titled "Environmentally Preferable Alternative." A condensed presentation of the detailed analysis of potential impacts provided in **Chapter 7: Treatment Impacts/Environmental Consequences** is provided next. Using the Council on Environmental Quality's (CEQ) interpretation, and the treatment alternatives impact analysis provided in **Chapter 7** of this **HSR/CLR/EA**, the environmentally preferable alternative has been determined to be the preferred alternative. A list of mitigation

measures is provided to minimize any adverse effects that would occur due the implementation of the preferred alternative.

Current Treatment (No Action Alternative)

The historic landscapes and structures at Minuteman Missile National Historic Site would continue to be managed as they are currently and no new course of action would be implemented. The no-action alternative provides a baseline for evaluating changes and impacts associated with the two action alternatives.

With the current management approach, the primary historic resources, including landscapes and structures, would be preserved and interpreted. The lack of improved visitor circulation, parking, and comfort facilities, would result in impacts related to visitor use. Possible examples include overflow parking along the access roads, leading to erosion and visual impacts, use of the historic core at both sites as turn-around areas or parking for large vehicles, and impacts to visitor experience due to the lack of comfort facilities.

Delta-01, Current Treatment

Delta-01 Spatial Organization Current Treatment

- Incremental changes are made to accommodate needs at the site. These have included the placement of portable toilets, use of the paved area inside the fence for visitor parking, and the addition of an electrical fence on the north side of the access road.

Delta-01 Land Use Current Treatment

- There is no plan for addressing use of the recreational areas by visitors.

Delta-01 Circulation Current Treatment

- Vehicular circulation does not provide an adequate turn-around outside the security fence for large vehicles. Visitors who stop at the Visitor Center are informed of this situation, but not all are informed prior to reaching the site.
- Alternatives to using personal vehicles are not in place. Currently, visitors in oversized vehicles do not have a good option for visiting the site.
- Visitor parking will remain inadequate. The visitor parking area contains four spaces and is often full during tours and open house hours.
- Visitors with mobility impairments utilize the ramp and exterior door next to the elevator to access the building. This entrance does not include a landing at the door, and therefore does not provide a universally accessible entrance.

- The road from the highway exit to the site contains large potholes and is not well maintained.

Delta-01 Topography and Views Current Treatment

- Provisions for scenic easements to protect significant views in areas that are privately owned are made in the General Management Plan. The park has initiated discussions with private property owners to establish protection for the views identified.
- There are no formal agreements in place to protect significant views that are within areas that are publically owned.

Delta-01 Vegetation Current Treatment

- No action is taken to eliminate vegetation from encroaching into the gravel areas surrounding landscape features.

Delta-01 Small Scale Features Current Treatment

- A small, unmarked electric fence is used to keep livestock from entering the area where visitors park.

Delta-01 Buildings and Structures Current Treatment

- The Launch Control Facility is in good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. Normal maintenance to repair damaged elements would occur.

For visitors who cannot climb the ladder in the case of an emergency and therefore cannot tour the Launch Control Center, continue the taped video presentation in the day room.

Delta-09, Current Treatment

Delta-09 Spatial Organization Current Treatment

- Incremental changes are made to accommodate needs at the site (placement of portable toilets, parking, etc.).

Delta-09 Land Use Current Treatment

- No additional visitor facilities will be added. The portable toilet will remain as the sole visitor facility on site.

Delta-09 Circulation Current Treatment

- Vehicular circulation does not provide an adequate turn-around outside the security fence for large vehicles. Visitors who stop at the Visitor Center are informed of this situation, but not all are informed prior to reaching the site.

- Alternatives to using personal vehicles are not in place. Currently, visitors in oversized vehicles do not have a good option for visiting the site.
- No clearly defined visitor parking area will be added.
- The site access drive is used for visitor parking, resulting in visitors getting blocked in when others arrive.
- There is no universally accessible route defined for visitors on site. The gravel surface is unconsolidated and too loose to accommodate wheelchairs.

Delta-09 Topography and Views Current Treatment

- There is no protection in place for significant views at the site that are within privately owned areas.
- There are no formal agreements in place to protect significant views that are within areas that are publically owned.

Delta-09 Vegetation Current Treatment

- Within the historic core, vegetation is encroaching into the gravel areas surrounding landscape features.

Delta-09 Buildings and Structures Current Treatment

- The Launch Facility is in good condition due to the cyclical maintenance provided by personnel from Ellsworth Air Force Base and the National Park Service. Normal maintenance to repair damaged elements would occur.

Preferred Alternative Goals

- Preserve the integrity of the cultural resources at Delta-01 and Delta-09.
- Improve the visitor experience at the park.
- Provide expanded facilities for visitors.
- Enhance interpretive opportunities related to the historic resources.

Delta-01, Preferred Alternative

Delta-01 Spatial Organization, Preferred Alternative:

- Develop a Landscape Preservation Maintenance Plan that addresses site needs including: maintenance of gravel surfaces, removal of vegetation, and monitoring and maintenance of landscape features.

Delta-01 Land Use, Preferred Alternative:

- Do not allow visitors to utilize the basketball hoop, volleyball and horseshoe courts while waiting for tours.

- Remove non-historic elements from within the historic boundary, including the portable toilet.
- Provide all visitor parking and interpretive waysides outside the historic boundary.

Delta-01 Circulation, Preferred Alternative:

- Acquire land to the east of the site (as indicated in the General Management Plan), on the eastern side of Jackson County Road CS 23A to use for a visitor parking area with fifteen car parking spaces and five spaces for recreational vehicles. Utilize topography to reduce the visibility of this development.
- At the new parking area, include adequate space for busses and recreational vehicles to turn around.
- Allow visitors with mobility impairments to park on the access road near the security gate (universally accessible parking).
- Provide a universally accessible route into the site and to the main building from the universally accessible parking area.
    - Visitors with mobility impairments may park at the designated parking area adjacent to the eastern side of the entrance gate. From that point, all exterior areas that are part of the ranger-led tour are paved with asphalt, providing an accessible surface.
    - To enter the launch control facility building, visitors with mobility impairments will utilize Door 9, the same door used by all visitors on the ranger led tour. The threshold to the door includes an approximately 5' square landing, raised approximately 6" above the ground surface. To provide access for visitors in wheelchairs, a removable wood sloped walk (approximately 5' wide and 10' long) may be placed along the southeast side of the building, extending to the southwest from the existing landing. The structure should be constructed in two to three pieces, so that it may be stored close to Door 9 and will be easy to install.
- Consider providing maintenance on the portion of Jackson County Road CS23A that provides access to the site from the highway.

Delta-01 Topography and Views, Preferred Alternative:

- Work with adjacent landowners to develop agreements to protect significant views identified in Figure 4-7.
- Consider purchasing scenic easements within the Historic Landscape Protection Area defined by the General Management Plan, to protect selected significant views.
- Improve drainage away from buildings. See building recommendations.

Delta-01 Vegetation, Preferred Alternative:

- In order to eliminate the encroachment of vegetation in gravel areas within the historic core, install asphalt pavement under the existing gravel surface

and then cover the pavement with a minimum of six inches of gravel. The result will be a surface that looks like the historic surface, but does not require frequent use of herbicides or regular applications of gravel in order to maintain the bare look that was present during the period of significance.

- Alternatively, apply approved herbicide as needed to control weeds on the site and supplement the gravel in areas that are thin, adding enough so the gravel surface is at least six inches thick.

Delta-01 Small Scale Features, Preferred Alternative:

Table 6-1: Delta-01 Small Scale Landscape Features, Preferred Alternative

Small Scale Features	Preferred Alternative
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	*Preserve*
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	*Preserve*
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	*Preserve*
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	*Preserve*
Cathodic protection rectifier (HS 110, IDLCS 100485)	*Preserve*
Two sewage lagoons (HS 108, IDLCS 100486)	*Preserve*
Helicopter pad (HS 109, IDLCS 100485)	*Preserve*
ICBM super-high frequency satellite terminal antenna (ISST) (HS 126, IDLCS 754345)	*Preserve*
Television satellite dish (HS 121, IDLCS 398298)	*Preserve*
HICS	*Preserve*
Security fencing (HS 113, IDLCS 287263)	*Preserve*
Sewage lagoon fencing / Livestock fencing (HS 125, IDLCS 754342)	*Preserve*
Cattle-guard (HS 129, IDLCS 754354)	*Preserve*
Electric fence	*Remove. Add livestock fencing that matches the fences around the sewage lagoons. If necessary, provide a gate at the rancher's easement.*
Historic signage (HS 117, IDLCS 354856)	*Preserve*
Protective bollards (HS 116, IDLCS 354857)	*Preserve*
Access road and parking area (HS 119, IDLCS 390289)	*Preserve*
Well and water tanks (HS 118, IDLCS 354851)	*Preserve*
Flagpole (HS 120, IDLCS 398270)	*Preserve*
Basketball goal (HS 112, IDLCS 287625)	*Preserve*
Volleyball court (HS 115, IDLCS 287266)	*Preserve*
Horseshoe court (HS 114, IDLCS 287261)	*Preserve*
Code burner (HS 111, IDLCS 287264)	*Preserve*
Interpretive wayside	*Maintain.*
Portable toilet	*Remove. Replace with small comfort station on the east side of County Road CS23A.*
Concrete pad, transfer switch, and generator	*Maintain.*

Small Scale Features	Preferred Alternative
Ranch	*Work with property owner to preserve the character of the ranch and views of the ranch from Delta-01.*
Jackson County Road C23A	*Consider providing maintenance on the portion of Jackson County Road CS23A that provides access to the site from the highway.*

Delta-01 Buildings and Structures, Preferred Alternative:

Launch Control Support Building

The Launch Control Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are maintenance in nature and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

Launch Control Support Building Exterior:

- At the time the asphalt apron adjacent to the south foundation wall needs to be replaced, the grade should be adjusted to slope away from the building.
- Miscellaneous metal brackets from the old security system, abandoned wiring, and abandoned conduit should be removed from the metal siding and the anchorage holes repaired with an epoxy made for steel and painted to match the siding color.
- Repair the security light at door #13, south elevation.
- Remove the damaged and non-functioning speaker at door #13 and repair anchorage holes, south elevation.
- Replace extant louver back into the opening in the north wall of Equipment Room 106. Block the back of the louver if air is not required to be drawn into the room.
- All cracked and damaged vinyl glazing stops should be replaced on the exterior face of all windows.
- All damaged or missing metal door holders should be replaced with new to match the original one still extant.
- When routine maintenance requires painting of exterior finishes, refer to Appendix A: Paint Analysis, for paint type and color used during the final episode during the period of significance. All surfaces should be painted to match the final episode.

Launch Control Support Building Exterior Accessibility:

- Addressed under Site Circulation.

Launch Control Support Building Interior:

- Generator Room 105: Repair water damaged drywall at the roof ventilator duct.
- Women's Latrine 116A: The hole in the floor of the vinyl shower stall should be repaired with epoxy filler tinted to match the color of the stall.
- When routine maintenance requires painting of exterior finishes, refer to Appendix A: Paint Analysis, for paint type and color used during the final episode during the period of significance. All surfaces should be painted to match the final episode.

Launch Control Support Building Interior Accessibility:

- Do not alter doors to the latrines. These small rooms may be viewed from the doorway and do not require entry to provide an interpretive overview of their use.
- Implement a plan for escorting rangers to provide tours for visitors in wheelchairs.
- Implement a plan for escorting rangers to provide assistance to visitors in wheelchairs so that they may pass through the security office doors between the elevator lobby and the living quarters.
- In the event that a visitor using a wheelchair indicates that they are physically able to climb a thirty-one foot ladder in an emergency, and that they wish to visit the Launch Control Center, implement a plan for leading a smaller than usual group. Since a wheelchair user can share the elevator car with only two or three standing individuals, provide a plan that allows for a smaller group, including one ranger and two or three visitors (one in a wheelchair) to tour the facility.
- For visitors who cannot climb the ladder in the case of an emergency and therefore cannot tour the Launch Control Capsule, implement a plan to allow a live feed to a monitor mounted on the south wall of the entrance shaft vestibule. This will allow the above ground visitors to have a real-time experience with their group. This will entail having multiple cameras installed at various locations in the Launch Control Center vestibule and Launch Control Capsule connected to the monitor, via a wireless connection, or through connecting cables.

Launch Control Support Building Life Safety:

- Because the Launch Control Capsule is a former military installation, and was not originally contemplated as a facility to be occupied by the general public, it is not surprising that this facility does not comply with the life-safety requirements. To attempt to provide a means of egress to this component of the facility which complies with current IBC requirements will be an enormously expensive undertaking requiring significant excavation and alteration of the historic Launch Control Capsule. Moreover this change will necessarily require a significant intervention either in the support building above or on the adjacent site, which would irreversibly disrupt the historic

fabric of the site. This structure is a unique case of a special-use historic building that IBC simply does not contemplate.

- Given the limited public access into both the support building and the capsule, and the unusual and historic nature of this structure, we believe that the NPS can occupy this facility with reasonable safety, provided that additional precautionary measures are taken to minimize safety risks to persons visiting the capsule. Therefore, we suggest that NPS consider obtaining a variance to permit the use of the structure in its current configuration, while employing additional safety measures to help protect visitors, such as:

  1. Continue to limit public access to groups of six at a time, with an escort.

  2. Train all rangers on site in emergency procedures, to assist visitors in exiting the capsule in the event of an emergency.

  3. Provide emergency voice communications equipment as required by Section 411, and a two-way communications system to permit contact between the ranger escort in the capsule and NPS staff above ground.

  4. Maintain standby power, connected to the facility's generator, to permit operation of the elevator under emergency conditions.

  5. Develop and implement procedures to assist visitors, should it be necessary to evacuate the capsule by means of the emergency escape ladder.

  6. Identify emergency exit locations within the capsule, in accordance with Section 411.

Mechanical, Electrical, and Plumbing Systems

- No treatment recommendations required. If other systems such as geothermal for heating and cooling or a variable refrigerant flow heat pump system are to be considered, it would entail major remodeling of the existing building.

  Launch Control Center

  - No treatment recommendations required.

  Vehicle Heated Storage Building

  - Exterior: No treatment recommendations required.
  - Interior: No treatment recommendations required.

Cathodic Protection System

A new engineered cathodic protection system should be installed. A new system, for the most part, can be installed outside of the fence line with minimal trenching in the historic core to re-establish the negative grounding grid to the extant underground structures.

Replacement of Materials

Preservation has been identified as the appropriate management philosophy for the historic structures at Delta-01. The mid-century modern materials, for the most part, are still readily available for maintenance issues or repair to damaged or deteriorated elements. For replacement of materials that will eventually fail over time, especially on the exterior of the structures, the two alternatives are to replace in-kind with identical features or to replace with contemporary materials that are as close as possible to the appearance, color, scale, texture, size and shape of the replaced elements. For those materials that are at the high end of being character defining features, replacement in-kind should be the preferred method of replacement. For those materials for which replication may be cost prohibitive, and are still readily available in the marketplace, the latter alternative should be the preferred method. In this case, representative samples of elements removed should be saved by marking, cataloging and archiving samples, so that future managers know what appearance to replicate when using replacement materials.

The following table identifies the character defining feature, the replacement philosophy, the rationale, and the time frame or priority of the treatment.

Table 6-2: Delta-01 Replacement of Materials

Building Character Defining Features (EXTERIOR)	Replacement Philosophy	Rationale	Priority
One-story rectangular ranch-style building form and orientation	*Preserve*	No additions or modifications should be made to the overall building form or orientation	Lifetime of the resource
One-story detached rectangular vehicle heated storage building form and orientation	*Preserve*	No additions or modifications should be made to the overall building form or orientation	Lifetime of the resource
8″ thick reinforced concrete foundation wall, painted brown and off-white	*Preserve*	Periodic maintenance by repainting exposed surfaces	Every 3 – 5 years

Building Character Defining Features (EXTERIOR, continued)	Replacement Philosophy	Rationale	Priority
Pre-fabricated steel siding, wood-grained embossed, 8" exposure with corner trim and window surrounds, pre-finished tan color	*Replace with contemporary siding that is similar in appearance*	Custom reproduction of the current siding will be cost prohibitive due to the small amounts of material. Similar siding is readily available.	Replace in the next 5 – 10 years
Hollow metal doors and frames, with ¼" wire glass in doors with vision panels, and hardware; doors painted tan with dark brown frames.	*Replace with contemporary doors and hardware that is similar in appearance*	Custom reproduction of doors and hardware will be cost prohibitive. Similar doors and hardware are readily available.	Replace in the next 5 – 10 years
Concrete door stoops, painted white on sides, and concrete and metal door stops, painted dark brown	*Preserve* *Repair or replace concrete in-kind when necessary.* *Replace door stops in-kind.*	The metal door stops may still be available, but if they cannot be found, new ones should be made to match the two that remain.	Replace the door stops in the next 1- 5 years
Shallow sloped gable roof covered with timber-blend 2-tab asphalt shingles; dark brown aluminum K-style gutters, soffit and fascia panels, and trim strips, and tan aluminum downspouts with dark brown concrete splash blocks	*Repair in kind.* *Replace roof system; shingles, gutters, fascia and downspouts with contemporary materials that are similar in appearance.*	Custom reproduction of the roof system components would be cost prohibitive due to the small amounts of material. Similar materials are readily available.	Replace in 20-25 years
Vinyl-clad wood one-over-one double hung windows and aluminum storm windows.	*Replace with contemporary windows and storms that are similar in appearance*	Custom reproduction of windows and storms will be cost prohibitive. Similar windows and storms are readily available.	Replace in the next 5 – 10 years
All attached utilities, including: Pipes, brackets, vents, louvers and hoods, electrical conduit, wind vane, light fixtures, etc., with the exception of utilities associated with the installation of the fire suppression system in 1999/2000.	*Repair or replace all miscellaneous utility components with contemporary materials that are similar in appearance with the exception of the wind vane which should be replaced in-kind.*	Custom reproduction of the utility components would be cost prohibitive due to the small amounts of material. Similar materials are readily available.	Replace as needed or in conjunction with other material replacements

Building Character Defining Features (INTERIOR)	***Replacement Philosophy***	**Rationale**	**Priority**
Building floor plan, including security/service area at the east, recreation/common areas in the center, and double-loaded bedroom corridor at the west end.	*Preserve*	No additions or modifications should be made to the overall building form or orientation.	Lifetime of the resource
Historic flooring material types: concrete, marbleized vinyl asbestos tile, marbleized asphalt tile, circa 1980s patterned carpet, ceramic tile.	*Preserve* *Repair or Replace in-kind when necessary*	The flooring materials and patterns are unique enough to require their reproduction.	Replace asphalt and VAT tile flooring, if needed in 5–10 years. Replace carpet flooring in 5–10 years. Replace ceramic tile, if needed, in 10–20 years.
Dark mauve carpet runners	*Replace with a contemporary carpet that is similar*	Non-contributing	Replace carpet in 5–10 years
Historic wall and ceiling materials: drywall, vinyl wood-grained or ceramic tile wainscot, wood paneling, fabric-covered or tegular acoustic tile, rubber base molding; extant color scheme on all finishes	*Preserve* *Repair in-kind.* *Replace with contemporary materials that are similar in appearance, when necessary*	Custom reproduction of the current interior finishes will be cost prohibitive due to the small amounts of material. Similar materials are readily available.	Repair as needed. Replace finishes, if needed, in 15–20 years Repaint every 4-8 years.
Solid core wood doors, painted or stained/varnished and some with vision glass panels; extant historic hardware; expanded metal gate painted white	*Preserve* *Replace all wood doors and hardware with contemporary doors and hardware that are similar in appearance, when necessary.* *Replace expanded metal gate in-kind, when necessary.*	Similar doors and hardware are readily available. The expanded metal may not be as easy to match.	Replace wood doors, if needed, in 15-20 years. Replace expanded metal gates, if needed, in 20-25 years.

Building Character Defining Features (INTERIOR, continued)	***Replacement Philosophy***	**Rationale**	**Priority**
Window treatments: tinted plastic roller shades, vinyl vertical blinds, vertical fabric curtains on retractable rods	*Preserve* *Replace with contemporary materials that are similar in appearance, when necessary.*	The extant window treatments are relatively non-descript and similar treatments are readily available.	Replace, if needed, in 15-20 years.
Fixtures: Wood shelving, security counter and equipment, entertainment console, kitchen cabinets, countertops, and equipment, bathroom fixtures and accessories, bedroom furniture, etc.	*Preserve* *Replace in-kind, when necessary.*	The extant fixtures are unique enough that they should be replicated if they need to be replaced.	Replace, if needed, in 15-20 years.
Elevator equipment	*Replace with contemporary equipment*	This is a safety issue; the elevator equipment must be reliable to access the Launch Control Center	The life expectancy of the equipment is approximately 50 years which means it is approaching the end; however, recent inspections have indicated the equipment is in good condition Replace in 5-10 years.
Expanded metal elevator shaft and cab & ladder system	*Preserve* *Repair and replace in-kind, when necessary*	This is a significant feature in the building and should be replicated if it ever needs to be replaced	Replace, if needed, in 25-30 years.

Building Character Defining Features (INTERIOR, continued)	Replacement Philosophy	Rationale	Priority
Mechanical system; boiler, fin tube cabinets, exposed fan coil units, etc.	*Replace in-kind where exposed in the Launch Control Facility interior rooms, replace with contemporary equipment in the utility rooms.* *Preserve abandoned equipment in place.*	It may be difficult to replace with new units that will look similar to what is extant. An alternative approach would be to change out the working interiors and keep the existing cabinets.	Replace in 10-15 years
Original generator	*Preserve*	Leave in place	Lifetime of the resource
Vestibule: concrete floor, walls, ceiling	*Preserve*	Original construction	Lifetime of the resource. Painted surfaces will need repainted every 4-8 years
Decorative paintings in vestibule	*Preserve*	Character defining features	Will need periodic conservation
Blast door and stop	*Preserve*	Character defining features	Lifetime of the resource
Launch control capsule structure: Concrete surface, steel interior liner, and associated equipment (shock isolators, water tank, utilities, etc).	*Preserve*	Character defining features	Lifetime of the resource. Shell will need to be painted every 4-8 years
Launch Control Capsule interior finishes and fixtures: carpeted floors, solid and perforated metal acoustic panels with sound absorption fabric panels on ceilings and walls, latrine, modular bed, launch equipment, etc.	*Preserve* *Replace in-kind for fabrics that will eventually deteriorate, when necessary.*	Character defining features	Carpet should be replaced in 5-10 years, other fabrics in 10-15 years

Next page:

Figure 6-1: Delta-01 Preferred Alternative

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

DELTA-01 PREFERRED TREATMENT ALTERNATIVE

0 40 80 160 240 NORTH

APPROXIMATE SCALE (FEET)

Line represents relationship between Delta-01 and Delta-09 (interpret at wayside/overlook).

16 parking spaces large car, luxury/elderly use, 10' stall width by 20' length

Bus parking

Wayside/overlook

6' wide sloped pedestrian route to Delta-01

Information sign and brochures on fence.

Replace electric fence with ranch fence.

Recreation wayside

Existing wayside

On the south side of the Launch Control Center: in the short-term, provide splash blocks at all down-spouts. In the long-term, adjust the grade of the asphalt to slope away from the building.

Remove portable toilet.

Interpretive wayside

20'x20' comfort station

Drop-off

Turning radius for intercity bus or school bus (55' outside radius and 33' inside radius).

Transportation wayside

Line represents relationship between overlook and Launch Control Center (interpret at overlook).

Provide two universally accessible parking spaces and administrative parking.

Harden gravel areas to minimize impacts from vegetation or apply approved herbicide when necessary.

JACKSON COUNTY ROAD CS 23A

MAP KEY

1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards •
17 Warning Signs ■
18 Well & Water Tanks
19 Asphalt Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Portable Toilet
35 Interpretive Wayside
36 Parking Lot

Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel

SOURCES

TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, LCS, 2009

QUINN EVANS ARCHITECTS

Delta-09, Preferred Alternative

Delta-09 Spatial Organization, Preferred Alternative:

- Develop a landscape management plan that addresses site needs.

Delta-09 Land Use, Preferred Alternative:

- Remove the portable toilet from within the historic core.
- Provide visitor parking for cars, busses and recreational vehicles along the western side of County Road T512.
- Provide a small comfort station with vault toilets for visitors.
- Provide universally accessible parking spaces in the parking lot.
- Provide interpretive waysides at key locations between the parking lot and the gate.
- Provide a universally accessible route between the comfort station, parking lot, interpretive waysides, and Delta-09 resources.

Delta-09 Circulation Preferred Alternative:

- Add visitor parking along the west side of County Road T512.
- Provide a universally accessible route into the site and to the viewing enclosure from the universally accessible parking area.

Delta-09 Topography and Views, Preferred Alternative:

- Work with adjacent landowners to develop agreements to protect primary and secondary views.
    - Based on *Figure 4-14: Delta-09 Existing Views and Ownership*, focus on protecting views in areas where privately owned land is located within the foreground views as indicated on the diagram.
    - If possible, also address the privately owned property located in Section 15 that is within the background views of Delta-09, as indicated in Figure 4-14.
- Monitor the area at the south side of the historic core that has had erosion problems. Continue to maintain positive drainage away from the historic resources.

Next pages:

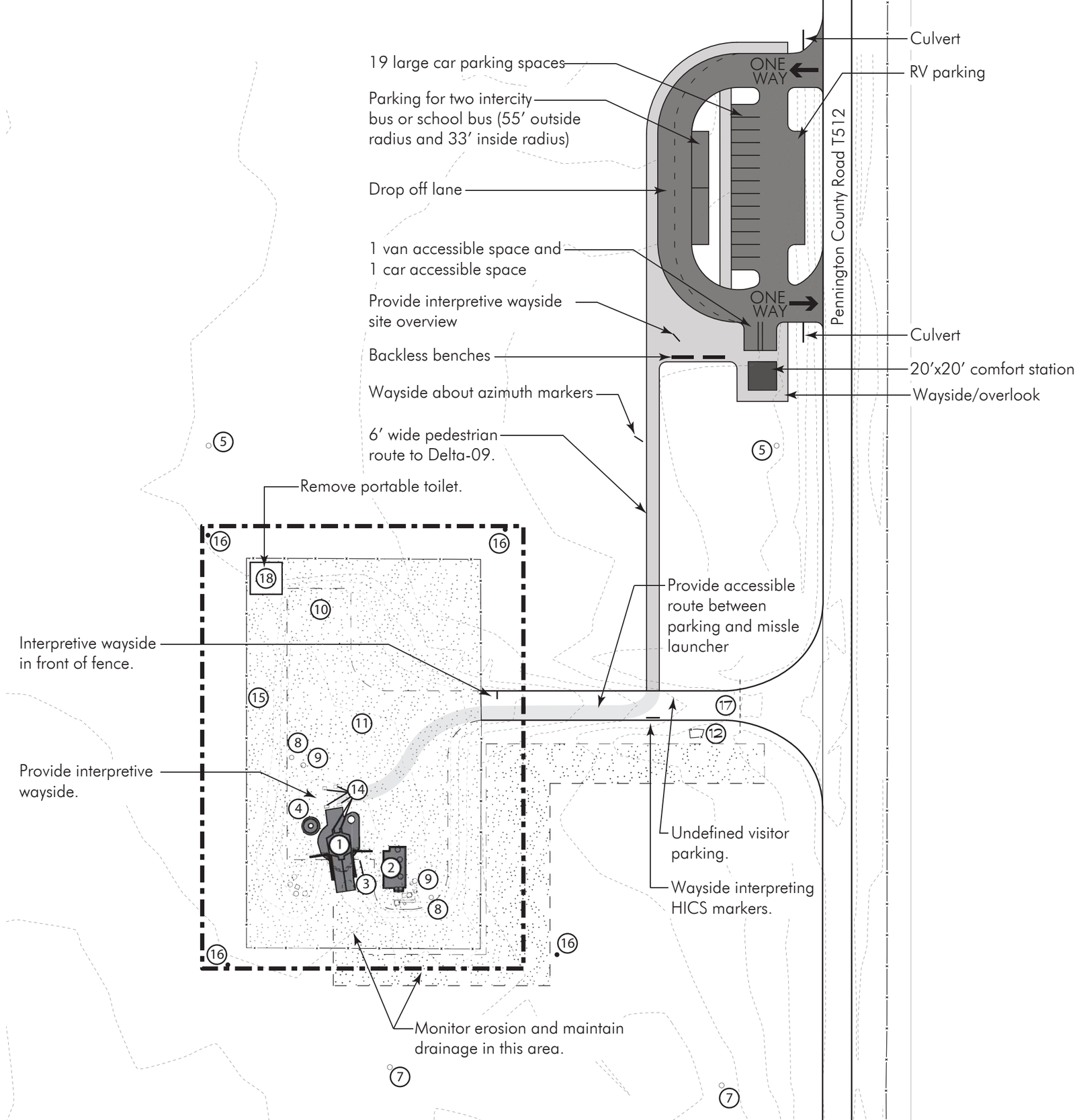
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Figure 6-2: Delta-09 Preferred Alternative

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA

HSR/CLR/EA
DRAFT JUNE 2010

DELTA-09 PREFERRED TREATMENT ALTERNATIVE



0 25 50 100 150 NORTH

APPROXIMATE SCALE (FEET)

MAP KEY

1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet

- Building
- Property Line
- Gravel Boundary
- Security Fence
- Contour Line
- Low Density Gravel
- High Density Gravel
- Asphalt
- Concrete

SOURCES

LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009

QUINN EVANS ARCHITECTS

Delta-09 Vegetation, Preferred Alternative:

- Determine the type of gravel that was present during the period of significance, and apply a minimum six inch layer of gravel in areas that are not identified as part of the universal access route.
- If necessary, apply approved herbicide as needed to control weeds on the site.

Delta-09 Small Scale Features, Preferred Alternative:

Table 6-3: Delta-09 Small Scale Features, Preferred Alternative

Small Scale Features	Preferred Alternative
Glass viewing enclosure	*Maintain*
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	*Preserve*
Hardened UHF antenna (HS 904, IDLCS 100491)	*Preserve*
Cathodic protection rectifier (HS 912, IDLCS 390310)	*Preserve*
Two azimuth markers (HS 905, IDLCS 100492)	*Preserve*
Two HICS marker posts (HS 907, IDLCS 345796)	*Preserve*
Security fence (HS 906, IDLCS 295903)	*Preserve*
Light posts (HS 908, IDLCS 354853)	*Preserve*
Bollard (HS 909, IDLCS 354859)	*Preserve*
Helipad & Markers (HS 910, IDLCS 354855)	*Preserve*
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	*Preserve*
Antenna piers (HS 913, IDLCS 400831)	*Preserve*
Transporter erector pylons (HS 914, IDLCS 412538)	*Preserve*
Launch facility warning signs (HS 915, IDLCS 754362)	*Preserve*
Culvert	*Maintain*
Drainage ditch	*Maintain*
Portable toilet	*Remove*

Delta-09 Buildings and Structures, Preferred Alternative:

Delta-09 Launch Facility

The Launch Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are maintenance in nature and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

- Replace caulking at the perimeter edge of the steel personnel access hatch.
- When routine maintenance requires painting of exterior finishes, refer to Appendix A: Paint Analysis, for paint type and color used during the final episode during the period of significance. All surfaces should be painted to match the last/current episode.

Structural Recommendations—General Concrete

- The silo apron slabs show surface deterioration and a penetrating, breathable sealant/consolidant is recommended below to mitigate this aging. Other surfaces such as the vault topping slab and silo retaining walls do not show the same surface deterioration; however, application of such a sealant should be considered for those elements.

Structural Recommendations--Equipment Vault

- Topping Slab: Previous attempts to patch the cracking in the topping slab appear to have been unsuccessful as the patch has worn off or is gone. These cracks should be sealed with an epoxy injection if possible. There are limits to minimum crack width that injection systems can fill. Some chemical companies (SIKA) promote gravity feed epoxy products which may be applicable for fine cracks. If the cracks are too fine for either injection or gravity feed then the cracks should be routed out and filled with a modified epoxy gel.

- Walls: Fine cracks were noted in the exterior walls exposed above grade. These should be either epoxy injected or filled as with the slab above.

Structural Recommendations--Silo

- Apron Slabs: These slabs show signs of spalling and cracking. Cracks should be sealed by epoxy injection. Loose spall should be removed and patched with an epoxy modified cementitious patching material. It is important to undercut the edges of patching areas as patching materials should not be feathered at the edges. A good penetrating sealant/consolidant (such as Prosoco H40) should be applied to the

exposed surface to minimize weathering deterioration. The sealant should not entrap moisture within the concrete.

- Minor Retaining Wall Cracks: Cracking should be sealed by injection or routing and patching as discussed for the vault slab.

Cathodic Protection System

A new engineered cathodic protection system should be installed. A new system, for the most part, can be installed outside of the fence line with minimal trenching in the historic core to re-establish the negative grounding grid to the extant underground structures.

Replacement of Materials

Preservation has been identified as the appropriate management philosophy for the historic structures at Delta-09. The mid-century modern materials, for the most part, are still readily available for maintenance issues or repair to damaged or deteriorated elements. For replacement of materials that will eventually fail over time, especially on the exterior of the structures, the two alternatives are to replace in-kind with identical features or to replace with contemporary materials that are as close as possible to the appearance, color, scale, texture, size and shape of the replaced elements. For those materials that are at the high end of being character defining features, replacement in-kind should be the preferred method of replacement. For those materials for which replication may be cost prohibitive, and are still readily available in the marketplace, the latter alternative should be the preferred method. In this case, representative samples of elements removed should be saved by marking, cataloging and archiving samples, so that future managers know what appearance to replicate when using replacement materials.

The following table identifies the character defining feature, the replacement philosophy, the rationale, and the time frame or priority of the treatment.

Table 6-4: Delta-09 Replacement of Materials

Character Defining Building Features	Replacement Philosophy	Rationale	Priority
Glass viewing enclosure	*Repair in-kind. Replace with contemporary system.*	Non-contributing	Replace in 15-20 years
Training model of missile	*Preserve or replace in-kind*	Important to the interpretive story	Lifetime of the resource
Concrete retaining walls	*Preserve or repair in-kind*	Contributing	Lifetime of the resource
Concrete launch apron and concrete/steel launch closure	*Preserve or repair in-kind*	Contributing	Lifetime of the resource
Concrete and steel closure tracks	*Preserve or repair in-kind*	Contributing	Lifetime of the resource
Underground concrete launch facility support building (vault) and associated equipment	*Preserve or repair in-kind*	Contributing	Lifetime of the resource
Steel personnel access hatch and steel pylons	*Preserve or repair in-kind*	Contributing	Lifetime of the resource
Concrete launch facility silo	*Preserve or repair in-kind*	Contributing	Lifetime of the resource

Summary of Alternatives

Table 6-5 summarizes the major elements of the Treatment Alternatives and tests each of these elements against the proposal objectives which were stated in Chapter 1. Table 6-5 reveals the Treatment Alternative that best meets the project objectives.

A comparative analysis of potential impacts from each alternative is summarized in Table 6-6. Only resource topics carried forward for analysis in this HSR/CLR/EA are included in the table. More detailed analysis and conclusions are provided in Chapter 7: *Treatment Impacts/Environmental Consequences*.

Table 6-5 Alternatives Summary and Extent to Which Each Alternative Meets Project Objectives		
Project Objectives	**Current Management (No Action Alternative)**	**Preferred Alternative**
Recommendations for addressing missing building or landscape features.	**1**	**2**
Recommended method for maintaining historic HVAC and cathodic protection systems.	**1**	**3**
Recommendations for paint schemes and interior/exterior finishes and treating small scale features such as security elements, antennae, structures and fence configuration.	**2**	**2**
Recommended approach for site interpretation, including placement of wayside exhibits and site signage.	**1**	**3**
Identification and justification of significant viewsheds from and to Delta-01 and Delta-09.	**1**	**3**
Recommended approach(es) for maintaining or replacing mid to late 20th century building materials and systems.	**2**	**3**
Development of schematic site planning for providing visitor services (including universal access, parking, pedestrian circulation, and restroom facilities) at Delta-01 and Delta-09.	**1**	**3**
TOTALS	**9**	**19**

1 = Partially Meets Project Objective
2 = Meets Basic Level of Objective
3 = Meets Highest Level of Objective

Table 6-6		
Resource Topic	**Current Management (No Action Alternative)**	**Preferred Alternative**
Buildings/Structures	• Direct, Indirect long-term, minor beneficial impacts **Section 106:** **No adverse effect**	• Direct and indirect long-term, minor beneficial impacts **Section 106:** **No adverse effect**
Landscapes	• Direct and indirect long-term, minor adverse impacts **Section 106:** **No adverse effect**	• Direct and indirect long-term, minor beneficial impacts to most landscape features. • Direct and indirect short and long term moderate adverse impacts to viewsheds of Delta-01 and Delta-09. **Section 106:** • **No adverse effect** for most landscape features. • **Adverse effect** to cultural landscape (viewsheds from Delta-01 and Delta -09).
Socioeconomics	• Direct and indirect long-term, negligible to minor beneficial impacts	• Direct and indirect long-term, minor beneficial impacts
Visitor Experience	• Direct and indirect long-term, minor beneficial impacts	• Direct and indirect long-term, minor beneficial impacts
Park Operations	• Direct and indirect long-term, negligible to minor adverse impacts	• Direct and indirect long-term, minor beneficial impacts

Mitigation Measures

Cultural Resources

- Conduct archeological inventories of proposed construction sites if archeological resources are determined to be eligible for listing in the National Register of Historic Places.
- Contractors utilized for construction projects would be instructed on procedures to follow in case previously unknown archaeological resources are uncovered during construction. If previously unknown archeological resources are unearthed during construction, work would be stopped in the area of discovery and the NPS would consult with the South Dakota SHPO and, as appropriate, the Advisory Council on Historic Preservation. If impacts to significant resources could not be avoided, mitigating measures would be developed in consultation with the SHPO to ensure that the informational significance of the sites would be preserved. If appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990 would be implemented.
- The NPS would ensure that any contractors utilized for construction are informed of the penalties for illegally collecting artifacts or intentionally damaging archaeological sites, or historic properties.
- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.

Park Operations

- The use of NPS Best Management Practices (BMPs) would mitigate short term and long term impacts to resources at Delta-01 and Delta-09.
- Fugitive dust generated by construction would be controlled by spraying water on the construction site, as needed. Water needed for dust control would come from park approved sources.
- To reduce noise and emissions, construction equipment would not be permitted to idle for long periods of time.
- To minimize potential petrochemical leaks from construction equipment, the equipment would be regularly monitored to identify and/or repair any leaks.

Visitor Experience

- To minimize the potential impact to park visitors, variation on construction timing may be considered, such as conducting a majority of the work in shoulder seasons.
- Construction zones would be identified and fenced with construction tape, snow fencing, or some other material prior to any construction activity. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone.

Environmentally Preferable Alternative

The Council on Environmental Quality (CEQ) NEPA regulations define the environmentally preferable alternative as the alternative that "…causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves and enhances historic, cultural and natural resources." The preferred alternative would result in minimal ground disturbance outside the perimeter fences of Delta-01 and Delta-09. The disturbances would be limited to a small parking area at each site and replacement of cathodic protection systems at each site. The preferred alternative would:

- Minimize long-term negative impacts to wildlife and natural systems from visitors parking along the sides of roadways and creating haphazard walking paths to the entrances of Delta-01 and Delta-09.
- Result in minimal disturbances to wildlife and natural systems during the short period of construction for the small parking areas at Delta-01 and Delta-09 and replacement of the cathodic protection systems.
- Limit all other site improvements to the highly disturbed areas within the perimeter fences for Delta-01 and Delta-09.
- Encourage landowners in the vicinity to minimize development on their properties, which would mitigate impacts to the cultural landscape, wildlife and natural systems.

No new information came forward during public scoping and early consultation with regulatory agencies or Native American tribes to necessitate the development of any new alternatives, or to choose another alternative as the environmentally preferable alternative. Therefore, after careful evaluation of all the factors involved, the preferred alternative was also identified as the environmentally preferable alternative.

Environmentally Preferable Alternative

The environmentally preferable alternative is determined by applying the criteria suggested in NEPA, which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "…the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101." Using the six criteria from Section 101 detailed below.

- ***Criterion 1—****Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.*
- ***Criterion 2—****Assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings.*
- ***Criterion 3—****Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.*

- ***Criterion 4—****Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.*
- ***Criterion 5—****Achieve a balance between population and resource use that will permit high standards of living and wide sharing of life's amenities.*
- ***Criterion 6—****Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*

The preferred alternative would implement a higher level of preservation than the no action alternative because of recommendations for maintaining current building and structure status, as well as recommendations for long term deterioration prevention. The preferred alternative would strike a balance between resources available and the desire to provide visitor facilities, while minimizing impacts to the natural and cultural resources at Delta-01 and Delta-09. The preferred alternative proposes protection of significant viewsheds from Delta-01 and Delta-09, which in addition to cumulative actions would benefit natural communities through preservation of a cultural resource—rural landscapes. Implementation of the preferred alternative, in context of cumulative actions in the region, would benefit local communities through improvements to the local economy today and into the future. Although some visitor amenities would result in adverse impacts to a portion of the foreground viewsheds, mitigation measures would be implemented to reduce the effects.

No new information has come forward during internal or public scoping; consultation with regulatory agencies or Native American tribes to necessitate the development of any new alternatives, other than those described and evaluated in this document.

Because it meets the purpose and need and objectives for the project and utilizing the CEQ's interpretations of the Section 101 criteria and the alternatives impact analysis in this document, it was determined that the preferred alternative is also the environmentally preferable alternative.

Chapter 7: Impacts from Treatment Alternatives / Environmental Consequences

Chapter 7: Impacts from Treatment Alternatives/ Environmental Consequences

Environmental Consequences

This chapter of the HSR/CLR/EA forms the scientific and analytic basis for the comparisons of treatment alternatives as required by 40 CFR 1502.14. This discussion of impacts (effects) is organized in parallel with *Chapter 3: Existing Conditions (Affected Environment)* and is organized by impact topic areas. The No Action Alternative (Current Treatment) and the Preferred Alternative are discussed within each impact topic area. Impact topics analyzed are Cultural Resources (Historic Buildings and Structures and Cultural Landscapes), Socioeconomics, Visitor Experience and Park Operations.

Potential impacts for this proposal are described in terms of type, context, duration, and intensity.

Type of impact refers to the consequences of implementing a given alternative as beneficial or adverse, direct or indirect:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
Direct: An effect that is caused by an action and occurs in the same time and place.
Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Context describes the area or location in which the impact will occur.

Duration describes the length of time an effect will occur, either short-term or long-term:

Short-term: Impacts generally last only during construction, and the resources resume their preconstruction conditions following construction.
Long-term: Impacts last beyond the construction period, and the resources may not resume their preconstruction conditions for a longer period of time following construction.

Professional judgment is used to reach reasonable conclusions as to the type, intensity, context and duration of potential impacts for each impact topic.

Comparison of Impacts

The comparison of impacts for each alternative is summarized in Table 6-6, which is at the end of *Chapter 6: Treatment Alternatives.* The impact analysis presented in this chapter results in a determination of the Environmentally Preferable Alternative, which is also described in *Chapter 6: Treatment Alternatives*.

Cumulative Impacts

The CEQ regulations require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are impacts on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts are considered for the no-action and proposed action alternatives.

Cumulative impacts were determined by combining the impacts of the no-action and action alternatives with other potential past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing or foreseeable future projects at Minuteman Missile National Historic Site, and if applicable, within the surrounding area. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis.

- Ongoing maintenance to Delta-01 and Delta-09.
- Minor changes to buildings and structures changes at Delta-01 and Delta-09 during military operations. Maintenance of military assets is critical to mission readiness and changes to facilities are typical when missions are adjusted and technology improves.
- Minor alterations to the sites were completed to meet the requirements of the National Park Service.
- Implementation of the Minuteman Missile National Historic Site General Management Plan; which includes construction of a Visitor Center at a site southeast of Delta-01. The preferred site is located just north of Exit 131 of Interstate 90.
- Expansion of the Museum Collection Storage Building at Badlands National Park.
- The visitor center at Badlands National Park is a few miles from Minuteman Missile National Historic Site.
- Implementation of the U.S. Forest Service's Nebraska National Forest Land and Resource Management Plan, which includes the Buffalo Gap National Grassland.
- The National Grasslands Visitor Center in Wall, SD is another visitor contact center in close proximity to Minuteman Missile NHS.
- The relatively recent construction of the cell phone tower in vicinity of Delta-01.
- There are limited development regulations in the region, which could result in incompatible development on private lands in the vicinity of Delta-01 and Delta-

09. Incompatible development could adversely affect viewsheds of the historic rural landscape.

- Local roads leading to sites are not well maintained.
- The NPS will prepare a Land Protection Plan for Minuteman Missile NHS.
- There is a potential for construction of wind turbines within the viewshed of Minuteman Missile NHS.

Impairment Analysis

The NPS *Management Policies 2006* requires analysis of potential effects to determine whether or not actions would impair park resources or values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or minimize to the greatest degree practicable, actions that would adversely affect park resources and values that are related to the legislative establishment of the park, National Historic Landmark, or other nationally significant resource.

These laws give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. Impairment may result from NPS activities in managing the park, from visitor activities, or from activities undertaken by concessionaires, contractors, and others operating in the park. Impairment of park resources can also occur from activities occurring outside park boundaries. An impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park;
- identified as a goal in the park's GMP or other relevant NPS planning documents.

An impairment determination is included in the environmental consequences analysis section for all impact topics relating to cultural resources at Minuteman Missile NHS.

Impacts to Cultural Resources

Basis for Analysis (Impacts to Cultural Resources)

In this integrated HSR/CLR/EA, impacts to historic properties are described in terms of type, context, duration, and intensity, which are consistent with the regulations of the CEQ. This HSR/CLR/EA is intended to comply with the requirements of both NEPA and Section 106 of the NHPA. To achieve this, a Section 106 summary is included under the Preferred Alternative for each of the cultural resource topics carried forward for analysis. The Section 106 summary is intended to meet the requirements of Section 106 and is an assessment of effect of the implementation of the preferred treatment alternative on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Under the Advisory Council's regulations, a determination of either adverse effect or no adverse effect must be made for affected historic properties that are eligible for, or listed in the National Register of Historic Places (NRHP). An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). *Adverse effects* also include reasonably foreseeable effects caused by the Preferred Alternative that would occur later in time; be farther removed by distance; or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

In accordance with the Advisory Council's regulations implementing Section 106, impacts to historic properties for this project were identified and evaluated by (1) determining the area of potential effect; (2) identifying cultural resources present in the area of potential effect that were listed in or eligible to be listed in the NRHP; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects. The area of potential effect was established in *Chapter 4: Building/Landscape Analysis and Evaluation* and further refined in *Chapter 6: Treatment Alternatives.*

CEQ regulations and the National Park Service's DO-12 also call for a discussion of the appropriateness of mitigation, as well as analysis of how effective the mitigation would be in reducing the intensity of a potential impact. Any reduction in intensity of impacts due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined in Section 106 is similarly

reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

Cultural Resources (Buildings, Structures, Landscapes)

Intensity levels:

- **Negligible:** Impact(s) would be at the lowest level of detection, or barely perceptible and not measurable. For the purposes of Section 106, the determination of effect would be — **no effect**.
- **Minor Adverse impact:** impacts would not affect buildings or the overall cultural landscape, or the significant landscape characteristics. For purposes of Section 106, the determination would be — **no adverse effect**.
  Beneficial impact: preservation of the buildings, structures, overall cultural landscape and significant landscape characteristics in accordance with the *Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.* For purposes of Section 106, the determination of effect would be — **no adverse effect**.
- **Moderate Adverse impact:** impacts would alter the cultural landscape or one or more of the significant landscape characteristics, buildings or structures, but would not diminish the integrity of the buildings or landscape to the extent that its NRHP status or eligibility is jeopardized. For purposes of Section 106, the determination would be — **adverse effect**.
  Beneficial impact: rehabilitation of the cultural landscape or one or more of the significant landscape characteristics and buildings in accordance with the *Secretary of Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*. For purposes of Section 106, the determination of effect would be — **no adverse effect**.
- **Major Adverse impact:** impacts would alter buildings, structures and the overall cultural landscape or one or more of the significant landscape characteristics, diminishing the integrity of the landscape to the extent that its NRHP status or eligibility is jeopardized. For purposes of Section 106, the determination would be — **adverse effect**.
  Beneficial impact: restoration of the buildings, structures and cultural landscape or one or more of the landscape characteristics in accordance with the *Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.* For purposes of Section 106, the determination of effect would be — **no adverse effect**.

Current Treatment (No Action Alternative) (Impacts to Cultural Resources)

Buildings and Structures

Analysis of No Action Alternative, Impacts to Cultural Resources

Delta-01: Due to constant maintenance from the Air Force during the period of military operations and from the National Park Service following transfer of ownership, the buildings and structures at Delta-01 were determined to be in good condition. Because the Launch Control Facility Support building and the vehicle storage building are aboveground, they are exposed to weather conditions, which hasten deterioration of exposed surfaces. The Launch Control Center and the vehicle storage building would continue to be maintained to current standards; however some minor interior and exterior treatments would completed over a longer time period due to limited NPS funding. Implementation of current management actions (no action alternative) could result in direct and indirect long-term, minor beneficial impacts to the facilities.

Delta-09: Similar maintenance standards were applied to the Launch facilities at Delta-09 over the years and the facilities at this site were determined to be in good condition. At Delta-09 the facilities are primarily underground and have less exposure to weather conditions, which results in fewer weather related maintenance issues. The Missile Launcher and Launch Facility Support Building would continue to be maintained to current standards; however some minor interior and exterior treatments could be incorporated into the cyclical maintenance programs to prevent deterioration of historic materials over time and as funding allows. Implementation of current management actions could result in direct and indirect long-term, minor beneficial impacts to the facilities.

Cumulative Impacts: Changes to the buildings and structures at Delta-01 and Delta-09 have occurred over time due to ongoing maintenance, technology improvements and safety requirements. Ongoing maintenance and safety improvements resulted in some minor alterations to the historic fabric of the facilities but have resulted in no adverse impacts to the sites. The implementation of current management actions would contribute minor beneficial impacts to the overall cumulative actions associated with the National Historic Site area.

Conclusion: Continuing current management actions, in addition to related cumulative actions would result in indirect long-term, minor beneficial impacts to buildings and structures at Minuteman Missile National Historic Site.

Impairment: Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Minuteman Missile National Historic Site; (2) key to the cultural integrity of the National Historic Site; or (3) identified as a goal in the National Historic Site's general management plan or

other relevant National Park Service planning documents, there would be no impairment of the National Historic Site's resources or values from the implementation of Current Management (No Action Alternative).

Section 106 Summary: The potential effects of Current Management (No Action Alternative) have been evaluated and after applying the Advisory Council's criteria of adverse effects (36 CFR Part 800.5), the National Park Service concludes that implementation of Current Management (No Action Alternative) would result in no adverse effect to the buildings, structures at Minuteman Missile National Historic Site.

Cultural Landscape

Analysis of No Action Alternative, Impacts to Cultural Resources

Delta-01: Ongoing maintenance by the Air Force extended to the landscape of Delta-01. However, the site's grounds were previously managed for military purposes, not interpretive purposes, or to accommodate numerous visitors. There is no protection in place to protect important viewsheds on lands that are privately owned and there are currently no agreements with public land owners to manage the rural landscape associated with Delta-01. Current management actions would account for some needs of visitors by providing incremental site improvements such as portable toilets and improved parking. Vehicle circulation would be incrementally improved if the no action alternative were implemented. Vehicles would still have to be parked at the current visitor parking area, which is not adequate to handle continually increasing numbers of visitors. Access to Delta-01 is on county-owned road, which due to minimal funding, is poorly maintained. Although there would be incremental improvements for individual personal vehicles, there would be no circulation improvements for larger vehicles such as recreational vehicles or busses. A small scale feature that has been added to the landscape in recent years is the small, unmarked electric fence that has been added to prevent livestock from entering the visitor parking area and damaging vehicles. This feature is not compatible with site features and is also a potential hazard to visitors. Implementation of current management actions (no action alternative) could result in indirect long-term, minor adverse impacts to the landscape of Delta-01.

Delta-09: Although visitation increases are anticipated, landscape circulation would not be improved and larger vehicles would not have adequate space to maneuver. Universal access would be improved on an incremental basis as funding allows. There is no protection in place for significant viewsheds on lands that are privately owned and there are currently no agreements with public land owners to manage the rural landscape associated with Delta-09. Ongoing vegetation management actions would be the same as Delta-01. Implementation of current management actions (no action alternative) could result in indirect long-term, minor adverse impacts to the landscape of Delta-09.

Cumulative Impacts: Although ongoing landscape maintenance has occurred at both Delta-01 and Delta-09 these past actions did not constitute adverse impacts to the landscape. The past action of erecting a cell tower outside the perimeter of Delta-01 has resulted in adverse impacts to the landscape and the lack of development regulations could result in additional adverse impacts to the landscape at some time in the foreseeable future. Potential long term development that might occur within view of Delta-01 and Delta-09 includes wind turbines. Although these structures are becoming more common in the rural landscape they would not be compatible with the viewsheds experienced by the missileers. The implementation of current management actions would contribute minor adverse impacts to the overall cumulative adverse impacts from actions associated with the National Historic Site area.

Conclusion: Continuing current management actions would result in indirect long-term, minor adverse impacts to the landscape at Minuteman Missile National Historic Site, but would only add minimal adverse effects to the overall cumulative adverse impacts.

Impairment: Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Minuteman Missile National Historic Site; (2) key to the cultural integrity of the National Historic Site; or (3) identified as a goal in the National Historic Site's general management plan or other relevant National Park Service planning documents, there would be no impairment of the National Historic Site's resources or values from the implementation of Current Management (No Action Alternative).

Section 106 Summary: The potential effects of Current Management (No Action Alternative) have been evaluated and after applying the Advisory Council's criteria of adverse effects (36 CFR Part 800.5), the National Park Service concludes that implementation of Current Management (No Action Alternative) would result in no adverse effect to the cultural landscape at Minuteman Missile National Historic Site.

Preferred Alternative: Preservation (Impacts to Cultural Resources)

Buildings and Structures

Analysis of Preferred Alternative, Impacts to Cultural Resources

Delta-01: The Preferred Alternative emphasizes preservation of the historic resources within Minuteman Missile National Historic Site. Exterior treatments to the Launch Control Support building would be incorporated into the park's maintenance cycle as funding allows. These proposed maintenance improvements include repairs to existing security and safety features, improvement of site drainage and window treatments. Minor interior treatments to the women's latrine and the generator at the Launch Control Support Building are recommended. No treatment recommendations to the Launch Control Center or the vehicle storage building are proposed. Replacement of the cathodic protection system in its current configuration and location would result in protection of subsurface facilities and mitigate potential negative impacts to structures or potential subsurface artifacts. The Preferred Alternative would result in direct and indirect, short and long-term, minor beneficial impacts to the historic fabric of the buildings and structures.

Delta-09: The Preferred Alternative emphasizes preservation of the historic resources within Minuteman Missile National Historic Site. The buildings and structures at Delta-09 were determined to be in good condition due to maintenance practices of the Air Force and NPS. Treatment recommendations, although not required to improve the physical condition of the facilities, could be incorporated into the park's maintenance cycle as funding allows. Minor exterior improvements to the personnel access hatch, application of sealants to exposed concrete to mitigate weathering and the replacement of the cathodic protection system are recommended. Implementation of these treatment recommendations would result in direct and indirect, short and long-term, minor beneficial impacts to the historic fabric of the buildings and structures at Delta-09.

Cumulative Impacts: Changes to the buildings and structures at Delta-01 and Delta-09 have occurred over time due to ongoing maintenance, technology improvements and safety requirements. Ongoing maintenance and safety improvements resulted in alterations to the historic fabric of the facilities but have resulted in no adverse impacts to the sites. The implementation of Preferred Alternative would contribute minor beneficial impacts to the overall cumulative actions associated with the National Historic Site area.

Conclusion: Implementation of the Preferred Alternative, would result in direct and indirect long-term, minor beneficial impacts to buildings and structures at Minuteman Missile National Historic Site and to the overall cumulative impacts associated with the National Historic Site.

Impairment: Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Minuteman Missile National Historic Site; (2) key to the cultural integrity of the National Historic Site; or (3) identified as a goal in the National Historic Site's general management plan or other relevant National Park Service planning documents, there would be no impairment of the National Historic Site's resources or values.

Section 106 Summary: The potential effects of the Preferred Alternative have been evaluated and after applying the Advisory Council's criteria of adverse effects (36 CFR Part 800.5), the National Park Service concludes that implementation of the Preferred Alternative would result in no adverse effect to buildings or structures at Minuteman Missile National Historic Site.

Cultural Landscape

Analysis of Preferred Alternative, Impacts to Cultural Resources

Delta-01: The Preferred Alternative emphasizes preservation of the historic landscape resources within Minuteman Missile National Historic Site. This alternative recommends development of policies for visitor access and behavior within the perimeter fence to mitigate potential negative impacts to site features. These policies would allow some use of recreational equipment by visitors, but with education and monitoring, these activities should not adversely impact landscape features. As identified in the General Management Plan, land would be acquired across the county road for construction of a visitor parking area. The new parking area would include enough space for large vehicle maneuvering. Utilization of existing parking near the security gate for universal access would result in fewer spaces in the new parking area across the county road. The Preferred Alternative establishes large areas within the rural landscape that are considered primary and secondary views from Delta-01 and Delta-09. The Preferred Alternative proposes negotiations with private and public landowners to encourage preservation of those rural landscapes. Most small scale landscape features would be preserved; however the small unmarked electric fence would be removed and replaced with a livestock fence compatible with typical fencing found in the vicinity. Vegetation management within the historic core could include continued use of appropriate herbicides, or construction of a asphalt base under the historically compatible gravel. Incompatible features such as the portable toilet and interpretive waysides would be removed and relocated to a proposed parking area. Most proposed landscape treatments would result in direct and indirect, short and long-term, minor beneficial impacts to the landscape at Delta-01. Although most proposed treatments in the Preferred Alternative would result in minor beneficial impacts to the historic landscape, the proposed construction of a parking area across the county road would result in direct and indirect, short and long-term moderate adverse impact to a portion of the landscape. The proposed location of the parking area would only affect a small portion of the overall viewshed from Delta-01. A minimum parking area to meet projected visitor counts is proposed. The siting of the proposed parking area is

also intended to mitigate adverse impacts to the viewshed. It is to the northeast of Delta-01, beyond a rise in elevation. Further mitigation could be use of disturbed soil from the site to create berms that will help to screen the parking area from Delta-01.

Delta-09 –This action alternative recommends adding visitor parking and a small vault toilet building northeast of the site. The parking area would be sized to accommodate projected visitor counts and include adequate space for maneuvering of larger vehicles such as busses and RVs. The parking area would include interpretive waysides. The portable toilet would be removed from the historic core and replaced with a small vault toilet building near the parking lot—outside the historic core. Most proposed treatments in the Preferred Alternative would result in direct and indirect, short and long-term, minor beneficial impacts to the landscape at Delta-09; but the construction of a parking area in proximity to the site would result in direct and indirect, short and long-term moderate adverse impact to a portion of the landscape. Similar to the situation at Delta-01, the parking lot would be approximately two acres in size, which is a very small percentage of the overall viewshed of Delta-09. Construction of the parking area would result in a direct and indirect, short and long-term moderate adverse impact to a portion of the landscape.

Cumulative Impacts: Site maintenance has occurred at both Delta-01 and Delta-09 by the Air Force and the National Park Service over the past decades; however these past actions did not constitute adverse impacts to the landscape. The past action of erecting a cell tower outside the perimeter of Delta-01 has resulted in adverse impacts to the landscape and limited development regulations could result in adverse impacts to the landscape at some time in the foreseeable future; however to mitigate the potential for adverse impacts, the Preferred Alternative recommends mitigation of adverse impacts through partnering with the South Dakota SHPO in negotiations with the current landowner in relocation of the cell tower and working with landowners to establish agreements to protect viewsheds. The implementation of current management actions would contribute minor beneficial impacts to the overall cumulative adverse impacts from actions associated with the National Historic Site area.

Conclusion: Implementation of the Preferred Alternative, would generally result in direct and indirect long-term, minor beneficial impacts to most features of the landscape at Minuteman Missile National Historic Site and to the overall cumulative actions associated with the National Historic Site; however the construction of parking areas at both Delta-01 and Delta-09 would result in moderate adverse impacts that would require mitigation.

Impairment: Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Minuteman Missile National Historic Site; (2) key to the cultural integrity of the National Historic Site; or (3)

identified as a goal in the National Historic Site's general management plan or other relevant National Park Service planning documents, there would be no impairment of the National Historic Site's resources or values.

Section 106 Summary: The potential effects of the Preferred Alternative have been evaluated and after applying the Advisory Council's criteria of adverse effects (36 CFR Part 800.5), the National Park Service concludes that implementation of most treatment recommendations in the Preferred Alternative would result in no adverse effect to the cultural landscape at Minuteman Missile National Historic Site. The construction of the parking areas at Delta-01 and Delta-09 would result in adverse effects to the viewsheds of the cultural landscape. Mitigation measures would be implemented.

Impacts to Socioeconomics

Basis for Analysis (Impacts to Socioeconomics)

The NPS Management Policies, Section 8.11 includes provisions for the study of social sciences, which encompasses the resource topic Socioeconomics. As it relates to the proposed action of implementing proposed Treatment Alternatives in this HSR/CLR/EA, the discussion of socioeconomics includes the potential effects to the local economy.

Intensity Levels:

- **Negligible:** Economic and socioeconomic conditions would not be affected, or effects would not be measurable.
- **Minor:** The effect on economic and socioeconomic conditions would be small but measurable, and would affect a small portion of the population. Few effects could be discerned outside of the local area.
- **Moderate:** The effect on economic and socioeconomic conditions would be readily apparent and widespread in the vicinity of Pennington and Shannon Counties, with effects being evident at the local level.
- **Major:** The effect on economic and socioeconomic conditions would be readily apparent and would substantially change the economy or social services within the three county region.

Current Treatment/No Action Alternative (Impacts to Socioeconomics)

Analysis: Continuation of current management actions at Minuteman Missile National Historic Site would result in direct and indirect, short and long-term, negligible to minor beneficial impacts to the local economy. Although the Current Management alternative would not include the site improvements recommended in the action alternatives, Minuteman Missile National Historic Site would still operate and provide opportunities for visitors to the region to gain insight into military history. The number of visitors has increased every year the National Historic Site has been open, and this is anticipated to continue due to proximity to I-90 and Badlands National Park.

Cumulative Impacts: Implementation of current management (no action alternative) would continue to build on past actions by local organizations and the NPS in establishing an expanding tourism component to the local economy. This alternative, when combined with past actions and any foreseeable actions including construction of a visitor center for Minuteman Missile National Historic Site should benefit the local economy, but would still fall within the low end of the minor intensity level.

Conclusion: Implementation of Current Management (no action alternative) would result in direct and indirect long-term, negligible to minor beneficial impacts to the local economy and to the overall cumulative impacts associated with the National Historic Site.

Treatment Alternative 1(Preferred Alternative) (Impacts to Socioeconomics)

Analysis: Implementation of the Preferred Alternative would result in improvements to visitor experience, preservation of historic resources, and the potential for an increased workload to cyclical maintenance. Improvements to visitor experience could result in longer stays at the National Historic Site, which could result in more local spending. Although construction of new parking areas within cultural landscape viewshed of Delta-01 and Delta-09 would result in adverse impacts to cultural resources there would be a short-term, direct minor benefit to the local economy during the period of construction. The improvements to visitor experience at both sites, which includes construction of the parking areas could result in an increase of repeat visitors, which could result in long-term benefits to the local economy. The increased workload for maintenance and preservation of historic resources could result in increased spending by park staff for supplies and potentially additional staff to maintain the sites. Recommendations to coordinate road improvements could benefit local residents as well as visitors, either through local government employment, or contracting of construction workers. Implementation of the Preferred Alternative would result in direct and indirect, short and long-term, minor beneficial impacts to the local economy.

Cumulative Impacts: Implementation of the Preferred Alternative would continue to build on past actions by local organizations and the NPS in establishing an expanding tourism component to the local economy. As tourist attractions continue to be added to the region, there would be increased incentives for visitors to extend their stay. Longer stays by visitors in this region will benefit local retailers and ultimately local residents. This alternative, when combined with past actions and any foreseeable actions should benefit the local economy, and provide direct and indirect, short and long-term, minor benefits to the local economy.

Conclusion: Implementation of the Preferred Alternative would result in direct and indirect long-term, minor beneficial impacts to the local economy and to the overall cumulative actions associated with Minuteman Missile National Historic Site.

Impacts to Visitor Experience

Basis for Analysis (Impacts to Visitor Experience)

NPS Management Policies state that enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitor to enjoy the parks. The analysis focuses on the potential affects from the overall guidance provided in the Alternative and whether those affects would benefit the visiting public.

Intensity levels:

- **Negligible –** a negligible effect would be a change that would not be perceptible or would be barely perceptible by most visitors.
- **Minor –** a slight change in a few visitor's experiences, which would be noticeable but which would result in little detraction or improvement in the quality of the experience.
- **Moderate –** a moderate effect would be a change in a large number of visitor's experiences that would result in a noticeable decrease or improvement in the quality of the experience. This would be indicated by a change in frustration level or inconvenience for a period of time.
- **Major –** a substantial improvement in many visitors' experience or a severe decrease in the quality of many visitors' experiences.

Current Treatment/No Action Alternative (Impacts to Visitor Experience)

Analysis: Implementation of current management would provide visitors the ability to experience military history through ranger-led tours at Delta-01. Self-guided tours are available at Delta-09. Visitors on tours at Delta-01 will be offered the opportunity to ride a small elevator to the launch control capsule. The ranger leading the tour will ask each visitor the question of whether or not the visitor could and would be willing to climb a ladder in case the elevator malfunctioned. If visitors choose to not ride the small elevator down to the launch control capsule, they would be given the opportunity to watch a pre-recorded video. Watching a pre-recorded video would likely result in a reduced visitor experience for those that chose to not ride the elevator down to the launch control capsule. Limited parking opportunities and visitor amenities would likely negatively affect visitor experience and reduce opportunities for large tour groups. Visitor experience could also be negatively affected by road conditions leading to Delta-01. Although visitors have some freedom to explore the site at Delta-01, there are no policies in place to allow a more active experience by using outdoor recreation equipment at the site. These limitations to visitor amenities could possibly result in reduced numbers of return visitors to either site. This may be particularly true for visitors traveling in RVs or bus tours. Continuation of current

management actions at Minuteman Missile National Historic Site could result in direct and indirect, long-term, minor beneficial impacts to visitor experience.

Cumulative Impacts: Continuation of current management provides a beneficial impact to visitor experiences. Implementation of this alternative in addition to the construction of a new visitor center for Minuteman Missile National Historic Site and other visitor attractions in the region would benefit visitors to a greater degree. Visitor experience would benefit through the increase in visitor attractions in this region. Other options include the National Grassland Visitor Center, increase visitor contact facilities at Badland National Park. Visitors will be provided additional opportunities to learn and play, which provides additional benefits to visitors. The visitor experience may be tempered due to past adverse actions such as construction of the cell tower, and potential future adverse actions such as potential development on properties in the vicinity of the National Historic Site; however current management would provide a minor beneficial impact to the cumulative adverse impacts associated with past and foreseeable future actions.

Conclusion: Implementation of current management (no action alternative) would result in direct and indirect long-term, minor beneficial impacts to visitor experience and to the overall cumulative impacts associated with the National Historic Site.

Treatment Alternative 1 (Preferred Alternative) (Impacts to Visitor Experience)

Analysis: Visitor experience would be enhanced through implementation of the Preferred Alternative. This alternative would provide increased visitor accessibility through parking lot improvements and routes for visitors with mobility impairments and proposed coordination of local road improvements. Interpretive waysides would be provided at strategic locations outside the historic core of Delta-01 and Delta-09 to reduce impacts to the cultural landscape. In addition to providing both ranger-led tours and interpretive signage at Delta-01, visitors will have the ability to utilize the outdoor recreation equipment while waiting for tours to start. This would provide more of a first person perspective on the daily lives of the missileers.

Visitors on tours at Delta-01 will be offered the opportunity to ride a small elevator to the launch control capsule. The ranger leading the tour will ask each visitor the question of whether or not the visitor could and would be willing to climb a ladder in case the elevator malfunctioned. If visitors choose to not ride the small elevator down to the launch control capsule, they would be given the opportunity to watch a live-feed video of the tour. Watching a live-feed video would result in a slightly less positive experience for visitors that chose to not ride the elevator down to the launch control capsule; however the live-feed video would provide a degree of a shared experience with other members of their group, which should reduce the negative impacts from not going down to the launch control capsule. Implementation of the Preferred Alternative at Minuteman Missile National Historic Site could result in direct and indirect, long-term, minor beneficial impacts to visitor experience.

Cumulative Impacts: Implementation of the Preferred Alternative provides a beneficial impact to visitor experiences. Implementation of this alternative in addition to the construction of a new visitor center for Minuteman Missile National Historic Site would benefit visitors to a greater degree. Visitor attractions are increasing in this region which provides additional opportunities to learn and play, which provides additional benefits to visitors. The visitor experience may be tempered due to past adverse actions such as construction of the cell tower, and potential future adverse actions such as potential development on properties in the vicinity of the National Historic Site. The Preferred Alternative would provide a minor beneficial impact to the cumulative adverse impacts associated with past and foreseeable future actions.
Conclusion: Implementation of the Preferred Alternative would result in direct and indirect long-term, minor beneficial impacts to visitor experience and to the overall cumulative impacts associated with the National Historic Site.

Impacts to Park Operations

Basis for Analysis (Impacts to Park Operations)

Implementation of any alternative would affect the operations of Minuteman Missile National Historic Site. This includes the number of staff required to accomplish recommendations for any alternative; when these actions would occur; and how these actions were to occur. Park operations related to maintenance of park structures and grounds and interpretation of the cultural and natural heritage of Minuteman Missile National Historic Site.

Intensity levels:

- **Negligible –** Park operations would not be affected or the effect would be at low levels of detection.
- **Minor –** The effect would be detectable, but would be of a magnitude that it would not have an appreciable adverse or beneficial effect on park operations.
- **Moderate –** The effect would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public.
- **Major –** The effect would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable by staff and the public, and would be markedly different from existing operations.

Current Treatment/No Action Alternative (Impacts to Park Operations)

Analysis: On-going maintenance and interpretive park operations would continue to be based out of the temporary administrative center at Cactus Flat in the short term. The continuation of current management actions at Minuteman Missile National Historic Site would result in ongoing maintenance, protection and preservation of the historic landscape features, buildings and structures within Delta-01 and Delta-09. However, in this alternative, on-going maintenance actions would be conducted without the benefit of additional guidance on maintenance, rehabilitation or restoration of historic resources at Delta-01 and Delta-09, and without additional interpretive facilities to assist Minuteman Missile National Historic Site interpretive staff in telling the story of the military history of the site and region. In addition, there are no facilities for NPS staff or rangers at Delta-09. When a ranger makes a trip out to Delta-09, they would have to sit in their vehicle to avoid poor weather conditions, or extreme sun or heat. The Current Management Alternative would result in direct, short and long-term, negligible to minor adverse impacts to park operations.

Cumulative Impacts: Implementation of this alternative and the potential future action of construction of a new visitor center for Minuteman Missile National Historic Site would benefit park operations by providing a more functional administrative facility for park staff that is not any farther from Delta-01 or Delta-09 than the current temporary facilities. This alternative, in addition to previous and future actions could result in short and long-term, negligible to minor beneficial impacts to park operations.

Conclusion: Implementation of current management (no action alternative) would result in direct and indirect long-term, negligible to minor adverse impacts to park operations and to the overall cumulative impacts associated with the National Historic Site.

Treatment Alternative 1, Preferred Alternative (Impacts to Park Operations)

Analysis: Implementation of this alternative would increase the workload of maintenance staff; however implementation of this alternative would also provide additional guidance on maintenance, rehabilitation or restoration of historic resources at Delta-01 and Delta-09. This alternative would provide additional support for interpretation of Delta-01 and Delta-09 through interpretive waysides. There would be minor increase in workload to install these signs, but in the long term they will offer visitors information on the stories associated with operations at both Delta-01 and Delta-09, without having constant contact with a Ranger. Interpretive waysides at Delta-09 would reduce the amount of time spent by rangers in traveling to and from that location. In addition, no facilities are proposed for rangers. When a ranger makes a trip out to Delta-09, they would have to sit in their vehicle to avoid poor weather conditions, or extreme sun or heat. Implementation of Treatment Alternative 1 at Minuteman Missile National Historic Site could result in direct and indirect, long-term, minor beneficial impacts to park operations.

Cumulative Impacts: Implementation of the Preferred Alternative in addition to the proposed future action of constructing a new visitor center would result in direct and indirect, long-term, minor beneficial impacts to park operations.

Conclusion: Implementation of the Preferred Alternative would result in direct and indirect long-term, minor beneficial impacts to park operations and to the overall cumulative impacts associated with the National Historic Site.

Chapter 8: Class "C" Cost Estimates

Chapter 8: Project Phasing and Class "C" Cost Estimates

Chapter 8 will be included in the next draft of this report.

Chapter 9: Consultation and Coordination

Chapter 9: Consultation and Coordination

Internal Scoping

Internal scoping was conducted by an interdisciplinary team of professionals from Minuteman Missile NHS, the NPS Midwest Regional Office and members of the consultant team. Interdisciplinary team members met at Minuteman Missile NHS on two separate occasions (June 9, 2008 and March 10-11, 2010) to discuss the purpose and need for the project; identify issues to be addressed; discuss a variety of preliminary treatment alternatives concepts; potential environmental impacts: past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. Team members also gathered at the site the week of June 29, 2009 to conduct additional data collection and extensive site visits at Delta-01 and Delta-09.

External Scoping

External public scoping was conducted to inform various stakeholders and the public about the proposal to establish treatments for historic landscapes and historic structures at Minuteman Missile NHS and to generate input on the preparation of this HSR/CLR/EA. The external public scoping was a similar process to the public scoping process for the Minuteman Missile NHS General Management Plan. Those stakeholders with a likely interest in the HSR/CLR/EA were contacted. Those contacted included affiliated Native American groups:

- Cheyenne River Sioux Tribe
- Crow Creek Sioux Tribe
- Flandreau Santee Sioux Tribe
- Lower Brule Sioux Tribe
- Oglala Sioux Tribe
- Sisseton-Wahpeton Sioux Tribe
- Rosebud Sioux Tribe
- Yankton Sioux Tribe
- Standing Rock Nation
- Ponca Tribe
- Omaha Tribe
- Santee Sioux Tribe
- Winnebago Tribe
- Spirit Lake Nation
- Three Affiliated Tribes
- Turtle Mountain Band of Chippewa
- Trenton Indian Service Area

External scoping also included regulatory agencies such as:

- South Dakota SHPO
- U.S. Fish and Wildlife Service

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D-09 Complete
D-09 Emplacement – DENR Photographs
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Appendix A: Paint Analysis Report

Welsh Color & Conservation, Inc.
Analysis of Historic Paints and Wallpapers

P.O. Box 767
Bryn Mawr, PA 19010-0767
Tel: 610-525-3564
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Website: www.welshcolor.com

MICROSCOPICAL PAINT AND COLOR ANALYSIS

PROJECT INFORMATION	CLIENT INFORMATION
Name: Launch Control Building Location: Minuteman Missile National Historic Site Construction Date: 1962 Style: Single Story Owner: National Park Service	Name: Steve Jones Company: Quinn Evans Architects Address: Ann Arbor, Michigan Phone: 734-663-5888 Email: sjones@quinnevans.com *Today's Date: 5/26/10*

DESCRIPTION OF PROJECT

To investigate and determine the nature and color of the paint finishes on the exterior and selected interior rooms that are associated with 1973 conversion to Minuteman II, and the most recent paint colors that were applied prior to official transfer of the site to the National Park Service in 2002.

SCOPE OF PROJECT

- Space: Exterior and Rooms: 101, 108, 114, 118 & 123
- Period of Significance: 1973 and ca. late 1990's
- Finishes analyzed for composition:
  - ☐ original
  - ☐ later
  - ■ none
- Finishes analyzed for color:
  - ☐ original
  - ■ later
  - ☐ none
- Color system used:
  - ■ Federal Standard Color System
  - ■ Munsell
  - ☐ none
- Finishes described by general color name only:
  - ■ all, except 1973 & c. 1990's
  - ☐ all, including original
- Historic documents referenced:
  - ☐ photographs
  - ☐ illustrations
  - ■ written
  - ☐ none

SITE INVESTIGATION/SAMPLING

- Sampled by: Frank S. Welsh
- Date sampled: June 10, 2009
- No. of samples taken: 48
- No. of samples analyzed:
  - 48 with stereomicroscope
  - 0 with polarized light microscope (PLM)
  - 0 with scanning electron microscope
  - 0 with FTIR
  - 0 crossection photomicrographs



Introduction

The Launch Control Building was completed in the early 1960's. The available documentation for painting the building at this time is limited to the color schedule, which is dated 1961-1962. All of the colors were specified using the Federal Standard Colors 595 color system. This color system is still in use today.

With the conversion to Minuteman II, the facility was upgraded and the interior was repainted for the first time since 1962. Specifications for this painting, dated 1973, were also made available to us. Once again the Federal Standard Color 595 system was used. In addition, the types of paint were included in this specification. They called for the use of alkyd oil paints.

No relevant historic photos for the 1962 and 1973 periods were available at the time of our investigation; however, original floor plans were available.

The building was continually painted through the late 1990's, prior to the transfer to National Park Service in 2002. No records of the paints and colors used after 1973 were known to exist at the time of our research. The period that will be interpreted is the most recent – representing the point at which the National Park Service took possession of the site. The interior was repainted in 2004. The colors used appear to match those that were already on the surfaces.

The scope of our services for the investigation, analyses and reporting was limited; i.e. it did not include the entire building nor color matching all paint layers. The scope of the investigation and sampling was limited to 48 samples taken from the exterior and five interior spaces. The rooms selected by the National Park Service included the Security Office - 101, Dining and Recreation Room - 108, Kitchen - 114, Bedroom - 118 & Facility Manager's Bedroom -123. By contractual agreement, the scope of the lab analyses and reporting was limited to identifying the layer structure on each sample and color matching *only the 1973 and most recent schemes* using either the Federal Standard Color or Munsell Color systems. However, since the color specifications existed for the original period, Welsh Color & Conservation, Inc. included the analysis and reporting of the 1960's colors as well.

Our findings are summarized in the following narratives and tables. Because we found that the colors specified were not always the colors that were actually used, we incorporated the variations in the tables. The colors in these comparative tables (6 pages) are illustrated digitally, not with actual color samples. The visual color reference samples for the 1973 and late 1990's – 2004 (most recent) schemes are presented in a separate table. Additionally, all colors can easily be referenced in the Federal Standard Colors 595 fan deck and in the Munsell Book of Color. Information about obtaining the Federal Standard Colors 595 fan deck is available at: http://www.fed-std-595.com/.

At the end of this report we have appended our laboratory data sheets as well as the two paint color specifications from 1962 and 1973.

SUMMARY OF FINISHES

Exterior

Only four samples were taken from the exterior during our on-site investigation. They are from a metal door and trim and two metal vents. A sample of the original cement asbestos siding, salvaged by the NPS, and a sample of the 1980's pre-finished siding were sent to us at a later time. We did not take any samples from the more recent windows. Consequently, our information concerning the most recent paint colors on the exterior is only partially complete for the three periods of significance.

In 1962, the cement asbestos siding was painted green. The metal door, door trim and smaller ventilation hoods were painted white. The large ventilation hood at the rear of the building was painted black. This scheme was repeated in 1973, except for the large vent in the rear that was painted white.

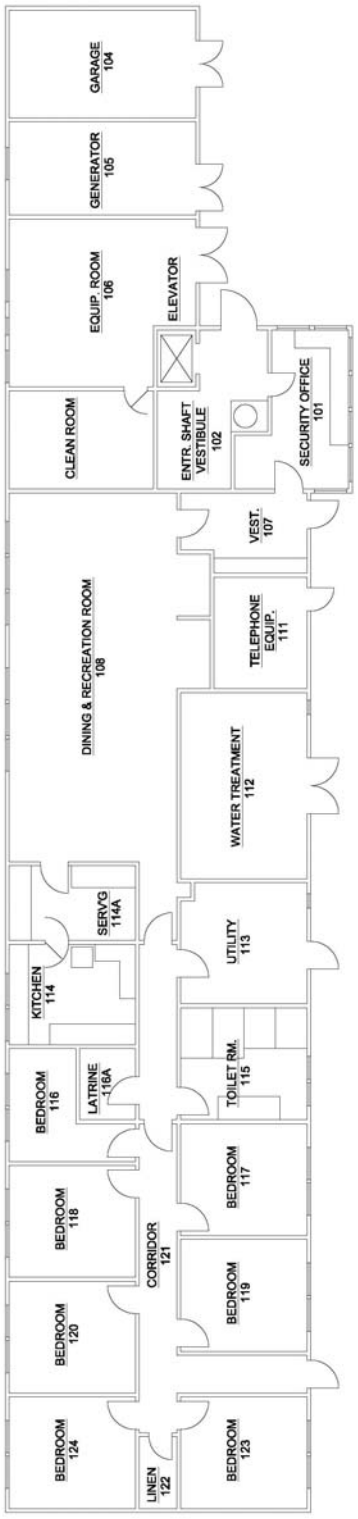
In the late 1990's, the metal door trim and ventilation hoods were painted dark brown. The metal doors were painted grayish yellow. The ca. 1980's pre-finished metal siding retained its original yellowish gray color and the windows were painted white. (See photo below taken in June 2009.)

The paint colors used on the sampled features during the intervening years between 1973 and the 1990's are presented in the appended lab data sheets.



Interior

It is rare that original color specifications survive in the documents associated with historic buildings; accordingly, it is very fortunate that both the original 1962 and 1973 specifications were located for this project. They describe most of the exterior and almost all of the interior spaces. All five of the rooms selected for study in this effort are covered in both sets of specifications. The colors are specified by the unique five digit numbers in the Federal Standard Colors 595 system. Our analysis of the colors in the rooms studied discloses that the colors specified were not always used. This is especially true of the 1973 painting effort. Because of these variations we constructed a table that shows the colors specified and also the actual colors used in the spaces. There were no documents for the most recent paint colors; consequently there is no column in the table for comparison in this period.


GARAGE 104
GENERATOR 105
EQUIP. ROOM 106
ELEVATOR
CLEAN ROOM
ENTR. SHAFT VESTIBULE 102
SECURITY OFFICE 101
VEST. 107
DINING & RECREATION ROOM 108
TELEPHONE EQUIP. 111
WATER TREATMENT 112
SERVG 114A
UTILITY 113
KITCHEN 114
BEDROOM 116
LATRINE 116A
TOILET RM. 115
BEDROOM 117
BEDROOM 118
CORRIDOR 121
BEDROOM 119
BEDROOM 120
BEDROOM 124
LINEN 122
BEDROOM 123
LAUNCH CONTROL BUILDING
SUPPORT FACILITY
DRAWING NORTH
FIRST FLOOR PLAN
0 5 10 20 FEET

Room 101: Security Office

In this small but most visible interior space the original specifications called for light green walls and trim, a green wainscot and a white ceiling. Our analysis discloses that these colors were actually used. In 1973, the specified colors were spring green on the trim, doors and wainscot, green on the walls and white on the ceiling. Once again, these colors were in fact used. In the most recent painting of the room, everything was painted white with the exception of the dropped ceiling and the small alcove space separated by a metal screen partition. The walls in this alcove space were painted dark brown. We were not able to take samples from the wainscot, as it was not accessible because of the console and also the wainscot paneling.

Of all the rooms investigated, this room has been repainted the most – approximately a dozen times with the exception of the metal door to the Entrance Shaft Vestibule. This door has been painted almost twice as many times as the other features in the room. By-and-large the color schemes evolved from light greens to medium greens to a medium blue, then dark brown and orange yellow in the mid-to-late 1900's until arriving at the present simplified scheme of all white. The complete layer structure on the eight samples taken in this space is presented in the appended laboratory data.





Security Office (June, 2009)

Room 108: Dining and Recreation Room

In this large gathering space the original specifications called for light tan trim, a different light tan for walls, and off white on the ceiling. None of the specified colors were used. A different light tan was used on the trim, doors and walls, and a different white was used on the ceiling. In 1973, the specified colors were sand on the trim and doors, buff on the walls, and white on the ceiling. None of these colors were used. Instead one shade of light green was used on both the doors, trim and walls and the ceiling was painted a different white. In the most recent painting of the room, everything was painted white with the exception of the ceiling which now has a dropped ceiling installed.

Over the years the color schemes evolved from light and medium greens to yellowish whites and whites. Wallpaper in imitation of grass cloth was installed on the walls in the mid-to-late 20th century. It was removed and the walls painted white in the late 1990's – at the same time that the dropped ceiling was installed. The wallpaper survives above the dropped ceiling and also around the water cooler on the south wall.





Dining and Recreation Room (June, 2009)

Room 114: Kitchen

In the Kitchen the original specifications called for light tan on the walls, and off white on the ceiling. No color was specified for the trim. Only one of the specified colors was used. A light tan was used on the trim and walls; the off white specified was used on the ceiling. In 1973, the specified colors were sand on the walls, and bone white on the ceiling. Again, no color was specified for the trim. None of these colors were used. Instead light green was used on both the trim and walls and the ceiling was painted a different white. In the most recent painting of the room, the trim and ceiling were painted white and the walls were painted light blue.

Over the years the color schemes evolved from light to yellowish whites and whites. The light blue on the walls is a very recent change. The painted masonite on the walls may or may not be original; it is impossible to know without removal of a small section to ascertain whether or not the walls behind are painted. Painted masonite panels were available in the 1960's. They are painted white now.




Kitchen (June, 2009)

Room 118: Bedroom

In this bedroom the original specifications called for light tan on the walls and trim and white on the ceiling. These colors were used. In 1973, they specified the same colors as in 1962. These colors; however, were not used. The walls and trim were painted light green; the ceiling white. In the most recent painting of the room, everything was painted white with the exception of the ceiling, which now has a dropped ceiling installed and the window glass, which is painted black.

Like other rooms, the color schemes in this bedroom have changed from the early light tans and greens to yellowish whites and now white.




Bedroom 118 (June, 2009)

Room 123: Facility Manager's Bedroom

In this bedroom the original specifications called for light tan on the walls and trim and white on the ceiling. These colors were used. In 1973, they specified the same colors as in 1962. These colors; however, were not used. The walls and trim were painted light green, the ceiling white. In the most recent painting of the room, everything was painted white with the exception of the west wall that was painted a medium gray and the ceiling, which now has a dropped ceiling installed.

Like other rooms the color schemes in this bedroom have changed from the early light tans and greens to yellowish whites and now white.





Facility Manager's Bedroom (June, 2009) Note the fabric on the north and east walls and the drop ceiling.

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Exterior	Doors	White 27875	White 27875	White 27875	White 27875	Grayish Yellow 10 YR 8/3
Exterior	Trim	White 27875	White 27875	White 27875	White 27875	Dark Brown 20045
Exterior	Siding (Cement asbestos up to ca. 1980's; then metal pre-finished siding was installed)	Not Specified	Green 34373	None Specified	No evidence of 1973 paint on salvaged siding sample	1980's Metal Siding Yellowish Gray 13578
Exterior	Roof Vents	Green 34373	Not Accessible Not Sampled	Green 14260	Not Accessible Not Sampled	Not Accessible Not Sampled

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Exterior	Ventilation Hoods in Front	Not Specified	White 27875	Not Specified	White 27875	Dark Brown 20045
Exterior	Large Ventilation Hood in Rear (but now in storage)	Not Specified	Black 17038	Not Specified	White 27875	White 27875
INTERIOR SPACES						
Security Office Room 101	Trim and Doors (1960's) Trim, Doors and Wainscot (1973)	Light Green 24554[1]	Light Green 24554	Spring Green 24491	Spring Green (Trim and Doors) 24491	White 27780
Security Office Room 101	Wainscot (1960's only)	Green 24373	Not Accessible Not Sampled	Not Called Out	Not Accessible Not Sampled	Not Accessible Not Sampled

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Security Office Room 101	Walls	Light Green 24554	Light Green 24554	Green 24672	Green 24672	White 27780
Security Office Room 101	Walls within alcove behind security screen	Same as above	Same as above	Same as above	Same as above	Dark Brown 10070
Security Office Room 101	Ceiling	Off White 27886	Off White 27886	White 27875	White 27875	White 27875
Dining & Rec. Rm. Room 108	Trim and Doors	Light Tan 13531	Grayish Yellow 13740	Sand 23617	Light Green 24554	White 27780

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Dining & Rec. Rm. Room 108	Walls	Light Tan 13531[2]	Grayish Yellow 13740	Buff 23690	Light Green 24554	White 27780
Dining & Rec. Rm. Room 108	Ceiling	Off White 27886	White 27875	White 27875	Off White 27886	Drop Ceiling
Kitchen Room 114	Trim	Not Specified	Grayish Yellow 23617	Not Specified	Light Green 24554	White 27780
Kitchen Room 114	Walls	Light Tan 13531[2]	Grayish Yellow 23617	Sand 23617	Light Green 24554	Light Blue 5 B 8/2

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Kitchen Room 114	Ceiling	Off White 27886	Off White 27886	Bone White 17886	Off White 27886	White 27780
Bedroom Room 118	Trim and Doors	Light Tan 23717[3]	Light Tan 23717	Light Tan 23717	Light Green 24554	White 27780
Bedroom Room 118	Walls	Light Tan 23717	Light Tan 23717	Light Tan 23717	Light Green 24554	White 27780
Bedroom Room 118	Ceiling	Off White 27886	White 27875	White 27875	Off White 27886	Dropped Ceiling

SUMMARY OF FINISHES

COLOR TABLE

Room Name and Number	Feature Painted	1960's Federal Standard Color Specified	1960's Actual Federal Standard Color Used	1973 Federal Standard Color Specified	1973 Actual Federal Standard Color Used	Most Recent Color Used (Federal Std. and/or Munsell Value)
Facility Manager's Bedroom Room 123	Trim and Doors	Light Tan 23717	Light Tan 23717	Light Tan 23717	Light Green 24554	White 27780
Facility Manager's Bedroom Room 123	Walls (Most recently the east and north walls were covered with fabric)	Light Tan 23717	Light Tan 23717	Light Tan 23717	Light Green 24554	White 27780 (south wall only)
Facility Manager's Bedroom Room 123	West Wall Only	Light Tan 23717	Light Tan 23717	Light Tan 23717	Light Green 24554	Medium Gray 26373
Facility Manager's Bedroom Room 123	Ceiling	Off White 27886	Off White 27886	White 27875	White 27875	Dropped Ceiling

Notes:

1. The specification calls for color #14554, which appears to be a typo. There is no color in the Federal Standard system with that number. We assume that the color number was to be 24554, which is the same as called out for the walls.
2. The specification calls for color #23531 (light tan), which appears to be a typo. We assume that the color number was to be13531, which is a light tan.
3. The specification calls for color #13717, which appears to be a typo. There is no color in the Federal Standard system with that number. We assume that the color number was to be 23717, which is the same as called out for the walls not only in the 1960's but also in 1973.

VISUAL COLOR REFERENCE SAMPLES FOR 1973 AND LATE 1990'S PAINT SCHEMES

White: 27875		White: 27780
Off White: 27886		Grayish Yellow: 10 YR 8/3
Yellowish Gray: 13578		Light Green: 24554
Green: 24672		Spring Green: 24491
Light Blue: 5 B 8/2		Medium Gray: 26373
Dark Brown: 20045		Black: 17038

Recommendations

If additional research is planned for the future we recommend that it include analysis of the paints on the other interior spaces that are interpreted on the tour of the building, and also the spaces associated with the elevator and launch control room. They too will need to be maintained and preserved, so documented colors will be essential for accurate repainting and interpretation.

Appendix B: Code Analysis

9 April 2010

MEMORANDUM

From: PATRICK M. ROACH, AIA, LEED AP

To: STEVEN C. JONES, AIA

QUINN EVANS
ARCHITECTS

219½ N. MAIN STREET
ANN ARBOR, MI 48104
734 663 5888

RE: MINUTEMAN MISSILE NATIONAL HISTORICAL SITE
PHILIP, SOUTH DAKOTA
08119-00

Subject: Life-Safety and Accessibility Assessment

We have completed a conceptual-level assessment of the Delta-01 Launch Control and Support Facility with respect to barrier-free accessibility and life-safety issues. This analysis was based on Chapters 3 through 10 of the 2006 International Building Code (IBC) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The project was not reviewed under the International Existing Building Code or under Chapter 34 of IBC.

The Delta-01 site consists of a one-story, ranch-style structure containing living quarters for the personnel at the site, a security office, and associated utility and support requirements. The structure is wood, platform framed, with a concrete foundation, qualifying as Type IIIB. The main floor is about 5,080 square feet. Constructed beneath this structure is an underground concrete capsule containing the missile launch control station. This underground capsule is accessed via an open elevator hoistway. Additionally, there are a number of communications structures on site and a detached heated vehicle storage facility. The vehicle storage facility and communications structures were not evaluated as part of this assessment.

The facility was de-commissioned by treaty and is now administered by the National Parks Service as a historical site. Public access to the site is currently limited to three groups of six individuals, escorted by ranger guides, at any time. While one group tours the above-ground launch support building, a second group tours the site, while the third group is escorted through the underground launch control facility. Permanent restroom facilities in the launch support building are not used. Temporary toilet facilities are available on site, and a comfort station near the site is contemplated by NPS to provide permanent barrier-free restroom facilities for the site.

Barrier-Free Issues

Because the launch support facility is a former military installation, it should not be surprising that the facility was not designed with accessible design in mind. Despite this, the building has few accessibility issues, owing mainly to the facts that it is a single story structure and that the existing restroom facilities within the structure are not available for public use. The two most significant barrier-free issues identified at the site are (1) the lack of barrier-free on-grade entrances and (2) the presence of narrow door openings in the building, which present obstacles to an accessible route through the building. Additionally, the elevator to the launch control capsule is not adequately sized to meet current barrier-free design requirements.

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Although the building is a one-story structure, the finish floor is set a few inches above grade. Although there is a sloped grade up to the utility area doors adjacent to the elevator lobby entrance (Door 4) it appears that this grade still does not provide suitable barrier-free access. Accessible entry to the building could be easily provided by means of some subtle grade adjustments, either at Door 4 or Door 9, to create a level transition to the door while minimally

affecting the appearance of the building. Other exterior entrance doors may be left as they are for historical interpretation purposes.

While there appears to be adequate width at the exterior entry doors and most interior doors along circulation paths, doors to the dormitory and security office spaces within the building, according to USAF as-built drawings, are 32 inches in width. In practice, this equates to about a 30 inch clear swing. Existing latrine doors are indicated to be 30 inches wide. The security office doors, which are the only available interior connection between the living quarters and the elevator lobby for the capsule, present an issue for the accessible route through the building. Approach clearances at doors vary throughout the building. Latch-side clearances are not always available, but maneuvering clearances generally are available.

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A minimum clear swing of 32 inches is required for doors by ADAAG. In practical terms, a 36-inch door is required to provide this minimum opening. However, the fact that public access is limited to small, escorted groups provides the opportunity for the escorting ranger to provide assistance to visitors in wheelchairs, for whom the width requirements are intended. Provided that doors along the accessible route are not so narrow as to preclude wheelchair passage altogether, a reasonable accommodation could be made for these visitors by providing assistance through the door opening. If self-guided tours are contemplated for this facility, however, it is recommended than narrow doors along the accessible route be replaced with 36-inch doors of the same design and materials, to accommodate wheelchair users.

The existing elevator to the launch control capsule is very small, and its use as a barrier-free means of access is consequently very limited. The cab measures approximately three feet by five feet. Consequently, an individual in a wheelchair will take up most of the space within the elevator.

The location of the elevator within the structure, and its servicing of an underground structure, precludes the possibility of alteration of the hoistway. Therefore it is neither practical nor technically feasible to provide a larger elevator car. It should be possible for a wheelchair user to maneuver into the car, and an accompanying ranger can operate the elevator controls, so it is possible to accommodate wheelchair users with this elevator. However, it is unlikely that a wheelchair user can share this car with more than two or three standing individuals, due to the space limits in the car, and this operational issue will need to be addressed by NPS.

Life-Safety Issues

Exit access, capacity and remoteness in the above-ground facility meet or exceed the requirements of IBC, with three available exits remotely located. The facility is fully-sprinklered and equipped with smoke detectors. Height and area requirements fall well within parameters established by IBC for the construction type (IIIB) of the building.

The real challenge to life-safety compliance at this facility is the launch control capsule. A confined underground space, this chamber is accessible only by means of the elevator, which is served by an open hoistway. An emergency escape ladder is present adjacent to the hoistway, which leads up to the ground-level elevator lobby. Typically, ladders such as these are not considered a valid means of egress. Open elevator hoistways connecting different floors of a building are not permitted under the current IBC. In this case, the elevator lobby is fully enclosed and provided with a direct means of egress (via Door 4), which mitigates some of the life-safety risk from the interconnection created by the open hoistway.

Under Chapter 4 of IBC 2006, it appears that the launch control capsule qualifies as both an underground building (Section 405) and as a Special Amusement Building (Section 411). Under Section 405, the Capsule appears to comply with exceptions due to its size, occupant capacity and distance below grade, and therefore the special rules of Section 405 do not apply. As a Special Amusement Building, the capsule is required to have automatic fire detection, sprinklers, marked paths to exits, an emergency voice communications system, and Class A interior finishes. Fire detection systems and sprinklers have been installed in the capsule. However, the emergency voice communication system is not, so far as we are aware, installed. As the facility is relatively small, the issue with egress deals not so much with the path to the exit not being clear, so much as the means of egress itself being not readily available. Interior finishes generally consist of painted metals and concrete. It is unknown whether the historic acoustical fabric ceiling panels installed in the control center are treated to perform as a Class A interior finish material.

Because the launch control capsule is a former military installation, and was not originally contemplated as a facility to be occupied by the general public, it is not surprising that this facility does not comply with the life-safety requirements. To attempt to provide a means of egress to this component of the facility which complies with current IBC requirements will be an enormously expensive undertaking requiring significant excavation and alteration of the historic launch control capsule. Moreover this change will necessarily require a significant intervention either in the support building above or on the adjacent site, which would irreversibly disrupt the historic fabric of the site. This structure is a unique case of a special-use historic building that IBC simply does not contemplate.

QUINN EVANS
ARCHITECTS

Given the limited public access into both the support building and the launch control capsule, and the unusual and historic nature of this structure, we believe that the NPS can occupy this facility with reasonable safety, provided that additional precautionary measures are taken to minimize safety risks to persons visiting the launch capsule. Therefore, we suggest that NPS consider obtaining a variance to permit the use of the structure in its current configuration, while employing additional safety measures to help protect visitors, such as:

1. Continue to limit public access to groups of six at a time, with an escort.
2. Train all rangers on site in emergency procedures, to assist visitors in exiting the capsule in the event of an emergency.
3. Provide emergency voice communications equipment as required by Section 411, and a two-way communications system to permit contact between the ranger escort in the capsule and NPS staff above ground.
4. Retrofit the existing elevator with standby power, connected to the facility's generator, to permit operation of the elevator under emergency conditions.
5. Develop and implement procedures to assist visitors, should it be necessary to evacuate the capsule by means of the emergency escape ladder.
6. Identify emergency exit locations within the capsule, in accordance with Section 411.

END OF MEMORANDUM

Quinn Evans Architects
Project No. 08119-00

Minuteman Missile NHS
Code Analysis - IBC 2006
Page 1 of 4

Section and Info		IBC 2006 Section	IBC 2006 Table	Comments
GENERAL NOTES REGARDING THIS ANALYSIS This analysis covers deals with life-safety issues for above-ground and below-ground occupiable facilities at the "Delta-01" site only.				
Chapter 3: Use and Occupancy Classification				
Use Group		302		
A-3	Museum/Exhibit	302.3.1		- *Assume any former utility or B-use spaces are part of the exhibit area. Any ancillary utility or service areas will be considered accessory or incidental to the primary use.*
Incidental Use Areas		302.1.1	302.1.1	
Furnace Rooms	1 Hour; or AFSS			*Over 400,000 Btu*
Boiler Rooms	1 Hour; or AFSS			*Over 15 psi and 10 HP*
Storage	1 Hour; or AFSS			*Over 100 SF*
Waste and Linen Collection	1 Hour; or AFSS			*Over 100 SF*
Occupancy Classifications				
Museum Exhibits	A-3	303.1		*Uses will be non-separated. Capsule may be considered a B use per Section 411 for life-safety purposes.*
Special Detailed Requirements Based on Use and Occupancy				*Refer to Chapter 4 of MBC 2003 for complete requirements in these areas.*
Underground Buildings		405		*Includes Launch Control Capsule*
General: Underground capsule is covered under exception 5 of 405.1, and therefore compliance with Section is not required.	Floor area of capsule appx. 1080 SF	405.1		*Exception applies when lowest story is the only one below grade, has an occupant load of less than 10, and a floor area of less than 1500 SF. Assumption that tour groups of the capsule will be so limited.*
Motor-Vehicle-Related Occupancies		406		*Garage is an accessory use to the building.*
Classification	Garage is Type U	406.1.1		
Separation	1/2-inch GWB on garage side.	406.1.4		
Special Amusement Buildings		411		*Applies to Capsule - see definition*
General	Special Amusement Buildings of less than 50 occupants shall be considered a B use.	410.3.7		*Capsule can be categorized as B use for life-safety purposes per this Section.*
Special Amusement Building, definition	"A special amusement building is any temporary or permanent building or portion thereof that is occupied for amusement, entertainment or educational purposes and that contains a device or system that conveys passengers or provides a walkway along, around or over a course in any direction so arranged that the means of egress path is not readily apparent due to visual or audio distractions or is intensionally confounded or is not readily available because of the nature of the attraction or mode of conveyance through the building or structure."	411.2		*Capsule appears to meet the definition of a special amusement building given its educational purpose, the presence of the elevator as the sole means of conveyance to and from the capsule, and the nature of the alternative means of egress (ladder to escape hatch) which is a result of the nature of the structure.*
Automatic Fire Detection	Required, compliant with 907.	411.3		*Required in capsule and capsule access areas only.*
Automatic Sprinkler System	Required throughout. 903.1.1.	411.4		*Appears only to be required within the capsule and its access areas but recommend that entire facility be sprinklered.*
Emergency Voice/Alarm Communications System	Compliant with 907.2.11 and 907.2.12.2, also serving as a public address system and audible throughout the entire special amusement building.	411.5		*This system should also be installed in the elevator and access areas. Recommend that it be installed throughout the building.*
Exit Marking	Exits must be marked, and paths to exits must be marked. If elements of the facility are designed to obscure the exits, then lighted exit signs shall be installed 8 inches above floor level which are activated upon activation of the fire detection and/or sprinkler system.	411.6		*Recommend activation of lighted exit signs (if required for this facility) through the emergency communications system as well. However these special exit signs may not be required if exit access can be made clear, or is clear.*
Interior Finish	Class A, compliant with 803.1	411.7		*Reductions for sprinklers not allowed within the special amusement building. Fabric ceiling panels are potentially an issue and are generally not allowed by current codes.*

4/9/2010

10:38 AM

Quinn Evans Architects
Project No. 08119-00

Minuteman Missile NHS
Code Analysis - IBC 2006
Page 2 of 4

Section and Info		IBC 2006 Section	IBC 2006 Table	Comments
General Building Heights and Areas				
Basic Height and Area Limitations		503		
Basic Height Limit, Stories	1 story		503	*Use Group A-3, Construction Type VB*
Basic Height Limit, Feet	40 feet		503	
Basic Area Limit, Square Feet	6000 SF per floor		503	
Height Increases		504		
Automatic Fire Suppression System	20 feet additional height 1 additional story	504.2		*where building is equipped throughout with an approved automatic sprinkler system in accordance w/ Section 903.3.1.1*
Roof structures	20 feet	504.3		
Limitations on Height Increases	Can be used in addition to area increases in Section 506.2 and 506.3	504.2		
Area Increases		506		
Allowable Area per Floor	18000 SF	506.1		*Only includes increase for sprinklers.*
Frontage	N/A	506.2		*Not calculated, increase not required.*
Automatic Fire Suppression System	300%	506.3		
Limitations on Area Increases	54000 SF Max	506.4		*3 times allowable area per floor*
Allowable Height and Area				
Maximum allowable height after increases, stories	2 stories			*Actual 1 story above grade*
Maximum allowable height after increases, feet	60 feet			*Actual 13 feet average roof height*
Maximum allowable area after increases, square feet	18000 SF			*Actual 5030 SF*
Maximum total allowable area after increases, square feet	54000 SF Max			*Actual 6110 SF* *Height and area increases are not required for the building to meet height and area requirements for Chapter 3. Sprinkler systems will be required for other purposes and the building's conformance within allowable limits is a demonstration of its overall safety.*
Construction Type				
Construction Classification		602		
Construction Type	VB	602.2		
Required Fire Resistance Ratings for Construction Type			601	
Structural Frame	0 hours			
Bearing Walls, Exterior	0 hours			
Bearing Walls, Interior	0 hours			
Non-Bearing Walls, Exterior	Varies with separation: 0 to less than 5 feet: 1 hour 5 to less than 10 feet: 1 hour 10 to less than 30 feet: 0 hour 30 feet or greater: 0 hours			*Separation Distances:* *East: 12 feet* *North: >30 feet* *South: >30 feet* *South: >30 feet*
Non-Bearing Walls, Interior	0 hours			
Floors	0 hours			
Roofs	0 hours			
Fire Resistance Rated Construction				
General		701		
Refer to requirements for separations and fire resistance ratings for special occupancy requirements, incidental use separations, and construction type listed above.				
Exterior Walls		704		
Allowable area of Openings: Protected	0 to 3 feet: Not Permitted		704.8	*Per 704.8.1 Limits for protected openings may be applied to non-protected openings for buildings equipped with AFSS.*
	Greater than 3 to 5 feet: 15% Greater than 5 to 10 feet: 25% Greater than 10 to 15 feet: 45% Greater than 15 to 20 feet: 75% Greater than 20 feet: No Limit			*See above for separation distances. Verify window areas for elevations with sep. distances of 20 feet or less.*
Allowable area of Openings: Not Protected	see protected openings	704.8.1		*AFSS throughout, same as protected openings*
Fire Walls		705		
Rating Requirement	2 hours		705.4	*Exception from 3 hours for Type V.*
Fire Barriers		706		
Rating Requirement for Fire Areas	2 hours between fire areas		706.3.9	
Shaft Enclosures		707		
Connecting up to three stories	1 hour	707.4		
Connecting four or more stories	2 hours	707.4		
Elevator Lobbies		707.14		
Rated Elevator Lobbies	Not Required	707.14.1		*per exception 4*
Fire Partitions		708		
Required Rating	1 hour unless superseded by Section 1017.	708.3		
Smoke Barriers		709		
Required Rating	1 hour	709.3		

4/9/2010

10:38 AM

Quinn Evans Architects
Project No. 08119-00

Minuteman Missile NHS
Code Analysis - IBC 2006
Page 3 of 4

Section and Info		IBC 2006 Section	Table	Comments
Smoke Partitions		710		
Required Rating	0 Hour	710.3		
Horizontal Assemblies	2 hour where separating uses, and not less than rating as required by construction type	711	302.3.2	
Penetrations		712		*Refer to specific Code requirements*
Fire-Resistant Joint Systems		713		*Refer to specific Code requirements*
Fire Resistance Rating of Structural Members		714		*Refer to specific Code requirements*
Opening Protectives		715		*Refer to specific Code requirements for labeling, glazing, and other requirements for protection of openings.*
Required Ratings:			715.4	
Fire Walls: 3 Hour	3 Hours			*(2) 90-min. doors are acceptable*
Fire Barriers: 2 Hours	1-1/2 Hours			
Fire Barriers: 1 Hour Shaft and Exit Enclosures	1 Hour			
Fire Barriers: Other 1 Hour	3/4 Hour			
Fire Partitions: Corridor	1/3 Hour			*See Section 715.4.3 for testing*
Fire Partitions: Other 1 Hour	3/4 Hour			
Fire Partitions: Other 1/2 Hour	1/3 Hour			
Smoke Barriers: 1 Hour	1/3 Hour			*See Section 715.4.3 for testing*
Ducts and Air Transfer Openings		716		*Refer to specific Code requirements*
Concealed Spaces		717		*Refer to specific Code requirements*
Fire Resistance Requirements for Plaster		718		*Refer to specific Code requirements*
Thermal and Sound Insulating Materials		719		*Refer to specific Code requirements*
Prescriptive Fire Resistance		720		*Refer to specific Code requirements*
Calculated Fire Resistance		721		*Refer to specific Code requirements*
Interior Finishes				
Finish Classifications by Occupancy - Sprinklered			803.5	
Vertical Exits and Passageways	B			*Classifications per Group A-3*
Exit Access corridors and other exitways	B			*Class A finishes are required for capsule. Verify ceiling textiles.*
Rooms and Enclosed spaces	C			
Fire Protection Systems				
Automatic Sprinkler Systems		903		
NFPA13 Sprinkler System	Required where the fire area is on a floor other than the level of exit discharge.	903.2.1.3		*Note: Sprinkler systems have already been installed. Modifications, if required, shall comply with requirements.*
Standpipe Systems	NOT REQUIRED	905		*- Existing Building.*
Portable Fire Extinguishers		906		
Locate per requirements of International Fire Code		906.1		
Fire Alarm and Detection Systems	Generally not required, see notes	907		*Automatic Fire detection, alarm and voice systems are required for Capsule by Section 411. Manual pull boxes are not required.*
Emergency Alarm Systems		908		*Not required for A Use.*
Smoke Control Systems		909		*As required by other Sections only*
Smoke and Heat Vents		910		*As required by other Sections only*
Fire Command Center		911		*As required by other Sections only*
Fire Department Connections		912		
Locations and Identification	As required by this Section	912.2		

4/9/2010

10:38 AM

Quinn Evans Architects
Project No. 08119-00

Minuteman Missile NHS
Code Analysis - IBC 2006
Page 4 of 4

Section and Info		IBC 2006 Section	IBC 2006 Table	Comments
Means of Egress				
Occupant Load		1004		
Design Area Requirements:			1004.1	
Business/Office	100 SF Gross/Occupant			*Capsule - limit of 10 or less per 405.*
Storage	300 SF/Occupant			*Garage*
Assembly (Unconcentrated)	15 SF/Occupant			*Exhibit/Gallery space. Exibit space is shared between occupants and exhibits. It is unlikely that this site will experience such concentrated loads.*
Special Restrictions on Occupant Load	**Building use is limited to tours of six persons plus one ranger in each level of the building at any time.**	**N/A**		*This use restriction is not specifically covered by Code but so long as this restriction is enforced it seems within reason that an enforcement body might permit a variance from occupant load requirements by floor area, given the special nature of this facility.*
Design Occupant Load		1004.1		
Launch Control Capsule (underground):				
Exhibit - Capsule	7			
First Floor:				
Exhibit - Launch Control Support Building	7			
Egress Width - Sprinklered		1005		
Stairs	44" Min/0.2 inches per occupant served		1005.1	*AFSS throughout*
Doors	32"/0.15 inches per occupant served		1005.1	*AFSS throughout*
Corridors and Other Components	44" Min		1005.1	*AFSS throughout*
Accessible Means of Egress		1007		
Number Required	Not Required	1007.1		*Exception - Not required in alterations to existing buildings*
Special Exit Access Requirements	**Exit access from Launch Capsule is only provided by means of elevator. An escape ladder is available but opens into the elevator machine room. Recommend that elevator be equipped with standby power and emergency operation systems to permit its use during an emergency.**			*The Code does not technically permit this insofar as can be determined. However, given that the launch capsule is considered a special amusement building, and will only be occupied by small groups with a trained guide, it seems within reason that an enforcement body might permit a variance for the type of exit provided, given the special nature of this facility.*
Exit Access		1014		
Maximum Common Path of Travel	75 feet	1014.3		
Exit and Exit Access Doorways		1015		
Number of Exits per Space	1-49 Occupants: 1. 50-500 Occupants: 2 501-1000: 3 1000+: 4	1014.1	1014.1 1018.1	
Arrangement	Minimum separation is one-half the diagonal measurement of the room or building footprint	1014.2		*May be reduced to one-third with sprinkler system.*
Boiler Rooms	2 exits required if room exceeds 500 SF and any piece of equipment exceeds 400,000 Btu	1014.3		
Chiller Rooms	3 exits required if room exceeds 1000 SF, with all areas within 150 feet of exit.	1014.4		
Exit Access Travel Distance		1016		
Required maximum distance to exit access	250 feet		1016.1	*AFSS throughout*
Corridors		1017		
Required rating	None		1017.1	*AFSS Throughout*
Minimum width subject to Occupant Load:	44 inches	1017.2		*24" permissible for mech areas, 36" permissible if serves less than 50*
Dead Ends	20 Feet	1017.3		
Number of Exits		1019		*Subject to exit access requirements for spaces.*
Each Floor	2 minimum		1019.1	
Buildings with One Exit	1 story above grade, one below grade: Max 49 occupants and 75 feet travel distance.		1019.2	*Multiple exits are required for the first floor due to travel distances. Travel distance is 62 feet within occupiable areas of launch capsule, to elevator.*
Vertical Exit Enclosures		1020		
Up to 3 stories	1 hour	1020.1		*Can elevator enclosure be upgraded to minimum 1 hour? Or enclosure and vestibule?*
4 or more stories	2 hour	1020.1		

4/9/2010

10:38 AM

Appendix C: Treatments Considered but Dismissed

Appendix C: Treatments Considered and Dismissed

Development of Treatment Alternatives

In October 2009, two action treatment alternatives were submitted to the National Park Service for review. A copy of the two action treatment alternatives, as presented in the October 2009 draft, is included in this Appendix. Upon review of the two alternatives, the need to further consider the programming needs of the park was apparent. To address this concern, a project workshop was held in March 2010. A copy of the agenda and notes from the workshop are included in this Appendix. Prior to the workshop, additional site design alternatives addressing possible solutions for visitor parking, comfort facilities, and large vehicle turn-around, were prepared. During the workshop, the attendees developed the site design scenarios presented in Chapter 6 as the preferred alternatives.

October 2009 Treatment Alternatives

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Goals Common to All Action Treatment Alternatives

- Preserve the integrity of the cultural resources at Delta-01 and Delta-09.
- Improve the visitor experience at the park.
- Provide expanded facilities for visitors.
- Enhance interpretive opportunities related to the historic resources.

Treatments Common to All Action Treatment Alternatives

Delta-01 Spatial Organization Recommendation, Common to All Action Alternatives:

- *Develop a landscape management plan that addresses site needs.

Delta-01 Circulation Recommendations, Common to All Action Alternatives:

- *Provide a universally accessible route into the site and to the main building from the universally accessible parking area.
- *Consider providing maintenance on the portion of Jackson County Road CS23A that provides access to the site from the highway.

Delta-01 Topography and Views Recommendations, Common to All Action Alternatives:

- *Install splash blocks at downspouts to move water away from the south elevation of the main building. See building recommendations.
- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-01 Small Scale Features Recommendations, Common to All Action Alternatives:

Table 6-1: Delta-01 Small Scale Landscape Features, Common to All Action Alternatives

Small Scale Features	Common to All Action Alternatives
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	**Preserve*
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	**Preserve*
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	**Preserve*
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	**Preserve*
Cathodic protection rectifier (HS 110, IDLCS 100485)	**Preserve*
Two sewage lagoons (HS 108, IDLCS 100486)	**Preserve*
Helicopter pad (HS 109, IDLCS 100485)	**Preserve*
ICBM super-high frequency satellite terminal antenna	**Preserve if Contributing (discuss with NPS staff) consider removing if non-contributing*
Television satellite dish (HS 121, IDLCS 398298)	**Preserve*
HICS	**Preserve*
Security fencing (HS 113, IDLCS 287263)	**Preserve*
Sewage lagoon fencing / Livestock fencing	**Preserve*
Cattle-guard	**Preserve*
Electric fence	**Remove. Add livestock fencing that matches the fences around the sewage lagoons. If necessary, provide a gate at the rancher's easement.*
Historic signage (HS 117, IDLCS 354856)	**Preserve*
Protective bollards (HS 116, IDLCS 354857)	**Preserve*
Access road and parking area (HS 119, IDLCS 390289)	**Preserve*
Well and water tanks (HS 118, IDLCS 354851)	**Preserve*
Flagpole (HS 120, IDLCS 398270)	**Preserve*
Basketball goal (HS 112, IDLCS 287625)	**Preserve*
Volleyball court (HS 115, IDLCS 287266)	**Preserve*

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Horseshoe court (HS 114, IDLCS 287261)	**Preserve*
Code burner (HS 111, IDLCS 287264)	**Preserve*
Cell tower	**Work with SHPO to encourage property owner to remove the tower.*
Ranch	**Work with property owner to preserve the character of the ranch and views of the ranch from Delta-01.*

Delta-01 Buildings Recommendations, Common to All Action Alternatives:

Launch Control Support Building

The Launch Control Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the buildings and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

Exterior:

- *At the time the asphalt apron adjacent to the south foundation wall needs to be replaced, the grade should be adjusted to slope away from the building.
- *Miscellaneous metal brackets from the old security system, abandoned wiring, and abandoned conduit should be removed from the metal siding and the anchorage holes repaired with an epoxy made for steel and painted to match the siding color.
- *Repair the security light at door #13, south elevation.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

- *Remove the damaged and non-functioning speaker at door #13 and repair anchorage holes, south elevation.
- *Replace extant louver back into the opening in the north wall of Equipment Room 106. Block of the back of the louver if air is not required to be drawn into the room.
- *All cracked and damaged vinyl glazing stops should be replaced on the exterior face of all windows.
- *All damaged or missing metal door holders should be replaced with new to match the original one still extant.

Interior

Generator Room 105

- *Repair water damaged drywall at the roof ventilator duct.

Women's Latrine 116A

- *The hole in the floor of the vinyl shower stall should be repaired with epoxy filler tinted to match the color of the stall.

Mechanical, Electrical, and Plumbing Systems

- *No treatment recommendations required. If other systems such as geothermal for heating and cooling or a variable refrigerant flow heat pump system are to be considered, it would entail major remodeling of the existing building.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Launch Control Center

- *No treatment recommendations required.

Vehicle Heated Storage Building

- *Exterior: No treatment recommendations required.
- *Interior: No treatment recommendations required.

Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Delta-09 Spatial Organization Recommendation, Common to All Action Alternatives:

- *Develop a landscape management plan that addresses site needs.

Delta-09 Land Use Recommendations, Common to All Action Alternatives:

- *Remove the portable toilet from within the historic core.

Delta-09 Circulation Recommendations, Common to All Action Alternatives:

- *Allow visitors with mobility impairments to park on the access road near the security gate (universally accessible parking).

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

- *Provide a universally accessible route into the site and to the viewing enclosure from the universally accessible parking area. *Find out what type of gravel was used during the POS. Add a layer of crushed stone over the existing surface. Match the color of the stone to that present during the period of significance. Use crushed stone and compact it to achieve a universally accessible surface.

Delta-09 Topography and Views Recommendations, Common to All Action Alternatives:

- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.
- *Erosion at the south side of the historic core has caused deterioration and the need for erosion control measures to be applied.

Delta-09 Vegetation Recommendations, Common to All Action Alternatives:

- *Determine the type of gravel that was present during the period of significance, and apply a minimum six inch layer of gravel in areas that are not identified as part of the universal access route.
- *If necessary, apply Garlon or similar herbicide as needed to control weeds on the site.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Small Scale Features Recommendations, Common to All Action Alternatives:

Table 6-2: Delta-09 Small Scale Landscape Features, Common to All Action Alternatives

Small Scale Features	Common to All Action Alternatives
Glass viewing enclosure	*Maintain
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	*Preserve
Hardened UHF antenna (HS 904, IDLCS 100491)	*Preserve
Cathodic protection rectifier (HS 912, IDLCS 390310)	*Preserve
Two azimuth markers (HS 905, IDLCS 100492)	*Preserve
Two HICS marker posts (HS 907, IDLCS 345796)	*Preserve
Security fence (HS 906, IDLCS 295903)	*Preserve
Light posts (HS 908, IDLCS 354853)	*Preserve
Bollard (HS 909, IDLCS 354859)	*Preserve
Helipad & Markers (HS 910, IDLCS 354855)	*Preserve
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	*Preserve
Antenna piers (HS 913, IDLCS 400831)	*Preserve
Transporter erector pylons (HS 914, IDLCS 412538)	*Preserve
Launch facility warning signs	*Preserve
Culvert	*Maintain
Drainage ditch	*Maintain

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Buildings & Structures Recommendations, Common to All Action Alternatives:

Delta-09 Launch Facility

The Launch Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the structures and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

- *Replace caulking at the perimeter edge of the steel personnel access hatch.

Structural Recommendations – General Concrete

- * The silo apron slabs show surface deterioration and a penetrating, breathable sealant/consolidant is recommended below to mitigate this aging. Other surfaces such as the vault topping slab and silo retaining walls do not show the same surface deterioration; however, application of such a sealant should be considered for those elements.

Structural Recommendations -- Equipment Vault

- *Topping Slab: Previous attempts to patch the cracking in the topping slab appear to have been unsuccessful as the patch has worn off or is gone. These cracks should be sealed with an epoxy injection if possible. There

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

are limits to minimum crack width that injection systems can fill. Some chemical companies (SIKA) promote gravity feed epoxy products which may be applicable for fine cracks. If the cracks are too fine for either injection or gravity feed then the cracks should be routed out and filled with a modified epoxy gel.

- *Walls: Fine cracks were noted in the exterior walls exposed above grade. These should be either epoxy injected or filled as with the slab above.

Structural Recommendations—Silo

- *Apron Slabs: These slabs show signs of spalling and cracking. Cracks should be sealed by epoxy injection. Loose spall should be removed and patched with an epoxy modified cementitious patching material. It is important to undercut the edges of patching areas as patching materials should not be feathered at the edges. A good penetrating sealant/consolidant (such as Prosoco H40) should be applied to the exposed surface to minimize weathering deterioration. The sealant should not entrap moisture within the concrete.

- *Minor Retaining Wall Cracks: Cracking should be sealed by injection or routing and patching as discussed for the vault slab.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Treatment Alternative 1: Preservation

This treatment alternative emphasizes preservation of the historic resources within the park. Figure 6-1: Delta-01 Treatment Alternative 1, and Figure 6-2: Delta-09 Treatment Alternative 1 illustrate the site recommendations described.

Delta-01, Treatment Alternative 1

Delta-01 Spatial Organization Recommendation, Treatment Alternative 1:

- *Develop a landscape management plan that addresses site needs.

Delta-01 Land Use Recommendations, Treatment Alternative 1:

- Do not allow visitors to utilize the basketball hoop, volleyball and horseshoe courts while waiting for tours. Treat these resources in the same way as the other resources and interpret their use.
- Remove the portable toilet.
- Retain the parking lot and interpretive wayside.

Delta-01 Circulation Recommendations, Treatment Alternative 1:

- Widen Jackson County Road CS23A near the point where it intersects with the site access road, and provide parallel parking along the County Road.
- Purchase an easement from the private property owner to utilize the ranch road as a turn-around for large vehicles.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

- Preserve the existing parking area and provide two universally accessible parking spaces in this lot.
- *Provide a universally accessible route into the site and to the main building from the universally accessible parking area.
- *Consider providing maintenance on the portion of Jackson County Road CS23A that provides access to the site from the highway.

Delta-01 Topography and Views Recommendations, Treatment Alternative 1:

- *Install splash blocks at downspouts to move water away from the south elevation of the main building. See building recommendations.
- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.
    - Based on *Figure 4-17: Delta-01 Views and Ownership*, focus on protecting views in areas where privately owned land is located within the close views as indicated on the diagram. These are mainly located in Sections 9, 15, and 16.

Delta-01 Vegetation Recommendations, Treatment Alternative 1:

- *Apply an approved herbicide as needed to control weeds on the site and supplement the gravel in areas that are thin, adding enough so the gravel surface is at least six inches thick.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-01 Small Scale Features Recommendations, Treatment Alternative 1:

Table 6-3: Delta-01 Small Scale Landscape Features, Treatment Alternative 1

Small Scale Features	Treatment Alternative 1
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	**Preserve*
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	**Preserve*
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	**Preserve*
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	**Preserve*
Cathodic protection rectifier (HS 110, IDLCS 100485)	**Preserve*
Two sewage lagoons (HS 108, IDLCS 100486)	**Preserve*
Helicopter pad (HS 109, IDLCS 100485)	**Preserve*
ICBM super-high frequency satellite terminal antenna	**Preserve if Contributing (discuss with NPS staff) consider removing if non-contributing*
Television satellite dish (HS 121, IDLCS 398298)	**Preserve*
HICS	**Preserve*
Security fencing (HS 113, IDLCS 287263)	**Preserve*
Sewage lagoon fencing / Livestock fencing	**Preserve*
Cattle-guard	**Preserve*
Electric fence	**Remove. Add livestock fencing that matches the fences around the sewage lagoons. If necessary, provide a gate at the rancher's easement.*
Historic signage (HS 117, IDLCS 354856)	**Preserve*
Protective bollards (HS 116, IDLCS 354857)	**Preserve*
Access road and parking area (HS 119, IDLCS 390289)	**Preserve*
Well and water tanks (HS 118, IDLCS 354851)	**Preserve*
Flagpole (HS 120, IDLCS 398270)	**Preserve*
Basketball goal (HS 112, IDLCS 287625)	**Preserve*
Volleyball court (HS 115, IDLCS 287266)	**Preserve*

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Horseshoe court (HS 114, IDLCS 287261)	**Preserve*
Code burner (HS 111, IDLCS 287264)	**Preserve*
Interpretive wayside	*Maintain*
Portable toilet	**Remove.*
Concrete pad, transformer, and generator	*Maintain*
Cell tower	**Work with SHPO to encourage property owner to remove the tower.*
Ranch	**Work with property owner to preserve the character of the ranch and views of the ranch from Delta-01.*

Delta-01 Buildings and Structures Recommendations, Treatment Alternative 1:

Launch Control Support Building

The Launch Control Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the buildings and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

Exterior

- *At the time the asphalt apron adjacent to the south foundation wall needs to be replaced, the grade should be adjusted to slope away from the building.
- *Miscellaneous metal brackets from the old security system, abandoned wiring, and abandoned conduit should be removed from the metal siding

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

and the anchorage holes repaired with an epoxy made for steel and painted to match the siding color.

- *Repair the security light at door #13, south elevation.
- *Remove the damaged and non-functioning speaker at door #13 and repair anchorage holes, south elevation.
- *Replace extant louver back into the opening in the north wall of Equipment Room 106. Block of the back of the louver if air is not required to be drawn into the room.
- *All cracked and damaged vinyl glazing stops should be replaced on the exterior face of all windows.
- *All damaged or missing metal door holders should be replaced with new to match the original one still extant.

Interior

Generator Room 105

- *Repair water damaged drywall at the roof ventilator duct.

Women's Latrine 116A

- *The hole in the floor of the vinyl shower stall should be repaired with epoxy filler tinted to match the color of the stall.

Mechanical, Electrical, and Plumbing Systems

- *No treatment recommendations required. If other systems such as geothermal for heating and cooling or a variable refrigerant flow heat

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

pump system are to be considered, it would entail major remodeling of the existing building.

Launch Control Center

- *No treatment recommendations required.

Vehicle Heated Storage Building

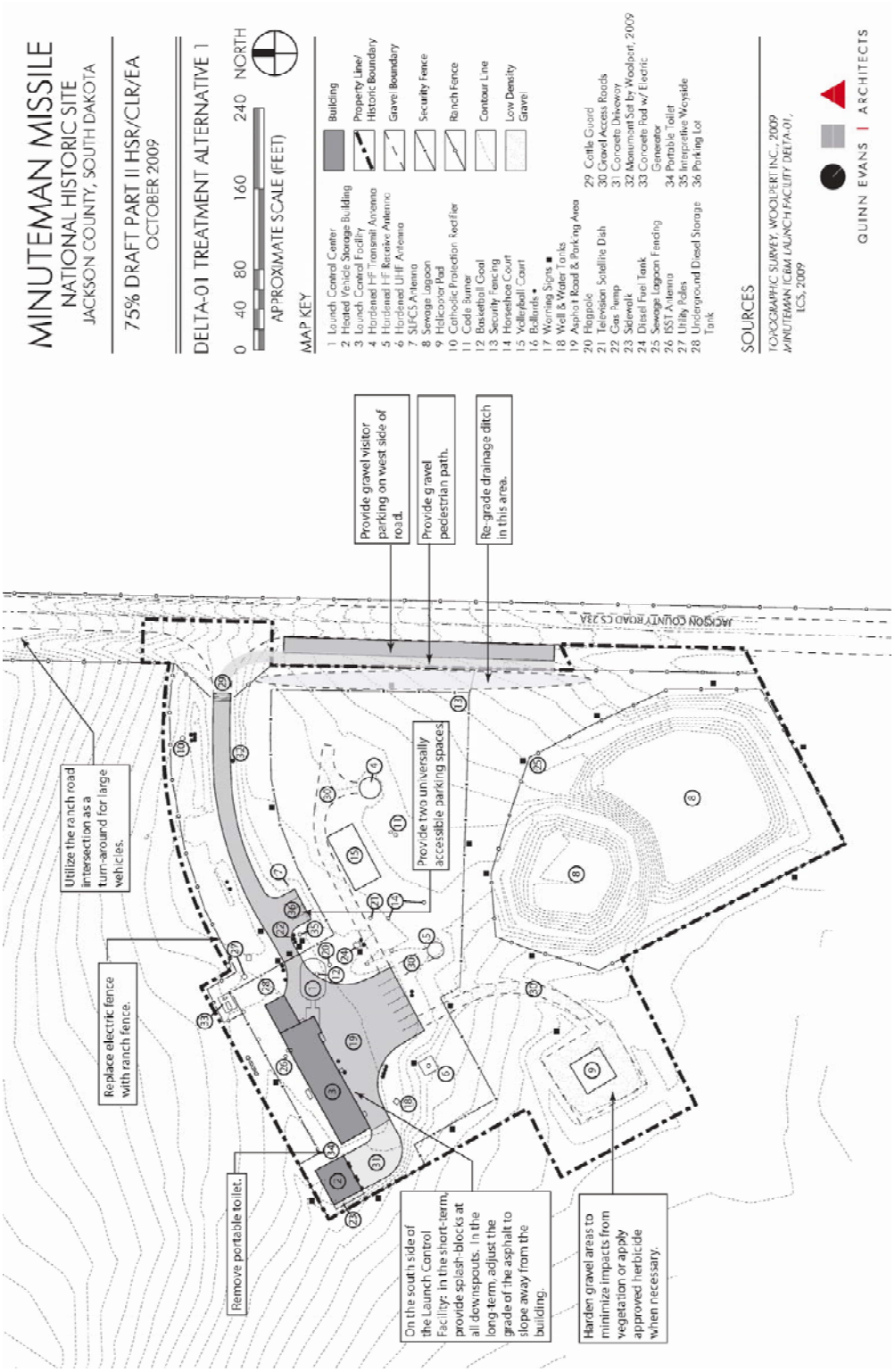
- *Exterior: No treatment recommendations required.
- *Interior: No treatment recommendations required.

Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Next page:

Figure 6-1: Delta-01 Treatment Alternative 1


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
75% DRAFT PART II HSR/CLR/EA
OCTOBER 2009
DELTA-01 TREATMENT ALTERNATIVE 1
0 40 80 160 240 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards
17 Warning Signs
18 Well & Water Tanks
19 Asphalt Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Portable Toilet
35 Interpretive Wayside
36 Parking Lot
Building
Property Line/ Historic Boundary
Grave Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel
SOURCES
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, ICS, 2009
QUINN EVANS | ARCHITECTS
Provide gravel visitor parking on west side of road.
Provide g ravel pedestrian path.
Re-grade drainage ditch in this area.
JACKSON COUNTY ROAD CS 23A
Utilize the ranch road intersection as a turn-around for large vehicles.
Provide two universally accessible parking spaces.
Replace electric fence with ranch fence.
Remove portable toilet.
On the south side of the Launch Control Facility: in the short-term, provide splash-blocks at all downspouts. In the long-term, adjust the grade of the asphalt to slope away from the building.
Harden gravel areas to minimize impacts from vegetation or apply approved herbicide when necessary.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09, Treatment Alternative 1

Delta-09 Spatial Organization Recommendation, Treatment Alternative 1:

- *Develop a landscape management plan that addresses site needs.

Delta-09 Land Use Recommendations, Treatment Alternative 1:

- *Remove the portable toilet from within the historic core.
- Provide visitor parking and an interpretive wayside along the side of County Road T512.

Delta-09 Circulation Recommendations, Treatment Alternative 1:

- Add visitor parking along the west side of County Road T512.
- Provide signs indicating that there is not adequate space for large vehicles to turn around at the I-90 exit.
- *Allow visitors with mobility impairments to park on the access road near the security gate (universally accessible parking).
- *Provide a universally accessible route into the site and to the viewing enclosure from the universally accessible parking area. *Find out what type of gravel was used during the POS. Add a layer of crushed stone over the existing surface. Match the color of the stone to that present during the period of significance. Use crushed stone and compact it to achieve a universally accessible surface.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Topography and Views Recommendations, Treatment Alternative 1:

- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.
  - Based on *Figure 4-14: Delta-09 Existing Views and Ownership*, focus on protecting views in areas where privately owned land is located within the close views as indicated on the diagram.
  - If possible, also address the privately owned property located in Section 15 that is within the far views of Delta-09, as indicated in Figure 4-14.
- *Monitor the area at the south side of the historic core that has had erosion problems. Continue to maintain positive drainage away from the historic resources.

Delta-09 Vegetation Recommendations, Treatment Alternative 1:

- *Determine the type of gravel that was present during the period of significance, and apply a minimum six inch layer of gravel in areas that are not identified as part of the universal access route.
- *If necessary, apply approved herbicide as needed to control weeds on the site.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Small Scale Features Recommendations, Treatment Alternative 1:

Table 6-4: Delta-09 Small Scale Landscape Features, Treatment Alternative 2

Small Scale Features	Treatment Alternative 2
Glass viewing enclosure	*Maintain
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	*Preserve
Hardened UHF antenna (HS 904, IDLCS 100491)	*Preserve
Cathodic protection rectifier (HS 912, IDLCS 390310)	*Preserve
Two azimuth markers (HS 905, IDLCS 100492)	*Preserve
Two HICS marker posts (HS 907, IDLCS 345796)	*Preserve
Security fence (HS 906, IDLCS 295903)	*Preserve
Light posts (HS 908, IDLCS 354853)	*Preserve
Bollard (HS 909, IDLCS 354859)	*Preserve
Helipad & Markers (HS 910, IDLCS 354855)	*Preserve
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	*Preserve
Antenna piers (HS 913, IDLCS 400831)	*Preserve
Transporter erector pylons (HS 914, IDLCS 412538)	*Preserve
Launch facility warning signs	*Preserve
Culvert	*Maintain
Drainage ditch	*Maintain
Portable toilet	Remove

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Buildings and Structures Recommendations, Treatment Alternative 1:

Delta-09 Launch Facility

The Launch Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the structures and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

- *Replace caulking at the perimeter edge of the steel personnel access hatch.

Structural Recommendations—General Concrete

- *The silo apron slabs show surface deterioration and a penetrating, breathable sealant/consolidant is recommended below to mitigate this aging. Other surfaces such as the vault topping slab and silo retaining walls do not show the same surface deterioration; however, application of such a sealant should be considered for those elements.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Structural Recommendations--Equipment Vault

- *Topping Slab: Previous attempts to patch the cracking in the topping slab appear to have been unsuccessful as the patch has worn off or is gone. These cracks should be sealed with an epoxy injection if possible. There are limits to minimum crack width that injection systems can fill. Some chemical companies (SIKA) promote gravity feed epoxy products which may be applicable for fine cracks. If the cracks are too fine for either injection or gravity feed then the cracks should be routed out and filled with a modified epoxy gel.

- *Walls: Fine cracks were noted in the exterior walls exposed above grade. These should be either epoxy injected or filled as with the slab above.

Structural Recommendations--Silo

- *Apron Slabs: These slabs show signs of spalling and cracking. Cracks should be sealed by epoxy injection. Loose spall should be removed and patched with an epoxy modified cementitious patching material. It is important to undercut the edges of patching areas as patching materials should not be feathered at the edges. A good penetrating sealant/consolidant (such as Prosoco H40) should be applied to the exposed surface to minimize weathering deterioration. The sealant should not entrap moisture within the concrete.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

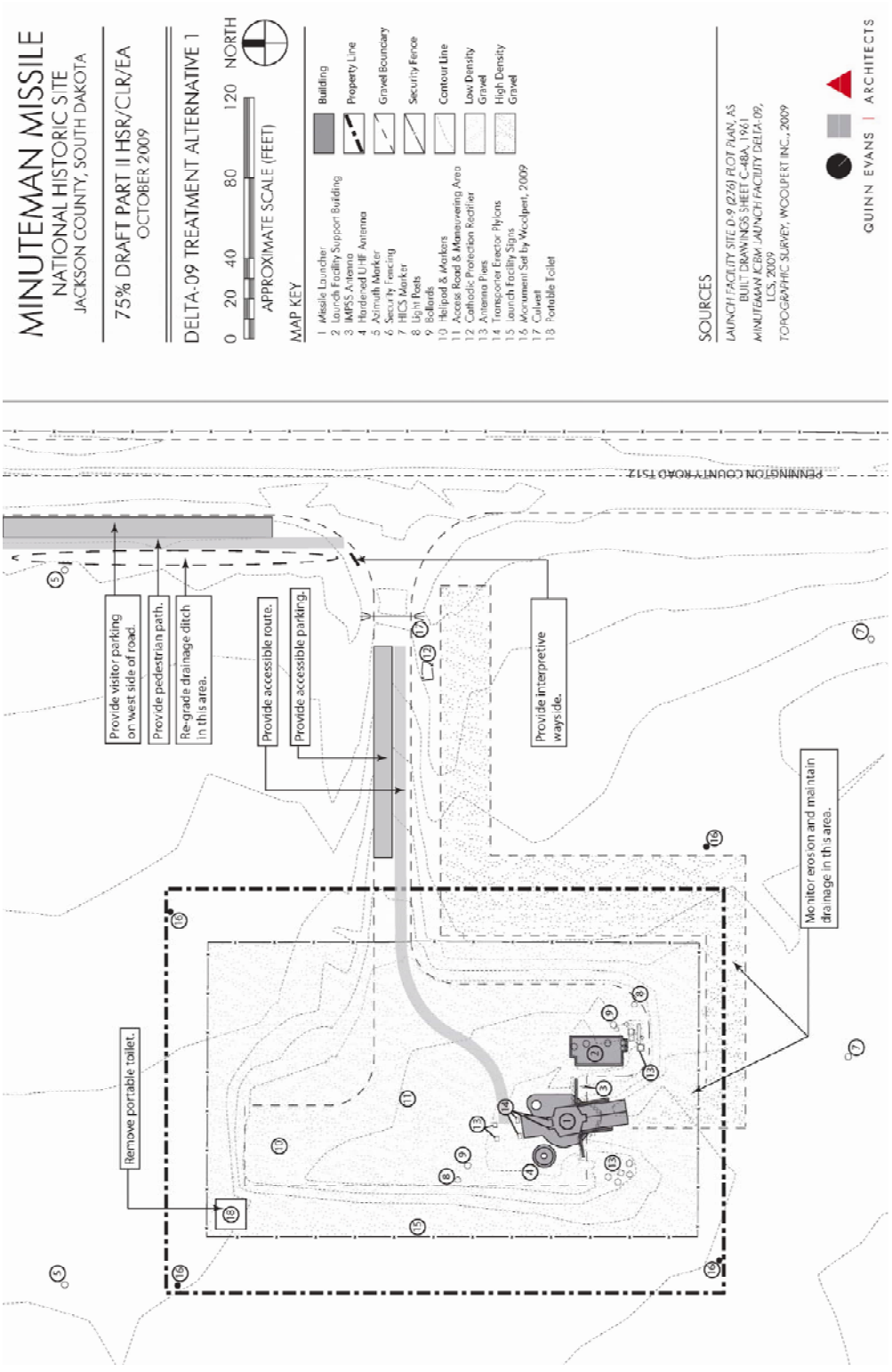
- *Minor Retaining Wall Cracks: Cracking should be sealed by injection or routing and patching as discussed for the vault slab.

Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Next page:

Figure 6-2: Delta-09 Treatment Alternative 2


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
75% DRAFT PART II HSR/CLR/EA
OCTOBER 2009
DELTA-09 TREATMENT ALTERNATIVE 1
0 20 40 80 120 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Poles
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Pads
14 Transporter Erector Plynns
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
SOURCES
LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
QUINN EVANS | ARCHITECTS
PENNINGTON COUNTY ROAD 1512
Provide visitor parking on west side of road.
Provide pedestrian path.
Re-grade drainage ditch in this area.
Provide accessible route.
Provide accessible parking.
Provide interpretive wayside.
Monitor erosion and maintain drainage in this area.
Remove portable toilet.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Treatment Alternative 2, Rehabilitation

This treatment alternative emphasizes enhancement of visitor services while preserving the significant resources. Major differences between this alternative and the other two include the addition of a visitor parking lot at Delta-01 and a visitor parking lot and comfort station at Delta-09.

Delta-01, Treatment Alternative 2

Delta-01 Spatial Organization Recommendation, Treatment Alternative 2:

- *Develop a landscape management plan that addresses site needs.

Delta-01 Land Use Recommendations, Treatment Alternative 2:

- Allow visitors to utilize the basketball hoop, volleyball and horseshoe courts while waiting for tours. This activity is consistent with the way the missileers used the site.
- *Remove non-historic elements from within the historic boundary, including the portable toilet, parking lot and interpretive wayside.
- *Provide all visitor parking and interpretive waysides outside the historic boundary.

Delta-01 Circulation Recommendations, Treatment Alternative 2:

- Acquire land to the east of the site, on the eastern side of Jackson County Road CS 23A to use for a visitor parking area with fifteen car parking

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

spaces and five spaces for recreational vehicles. Utilize topography to reduce the visibility of this development.

- At the new parking area, include adequate space for busses and recreational vehicles to turn around.
- Allow visitors with mobility impairments to park on the access road near the security gate (universally accessible parking).
- *Provide a universally accessible route into the site and to the main building from the universally accessible parking area.
- *Consider providing maintenance on the portion of Jackson County Road CS23A that provides access to the site from the highway.

Delta-01 Topography and Views Recommendations, Treatment Alternative 2:

- *Install splash blocks at downspouts to move water away from the south elevation of the main building. See building recommendations.
- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.
    - Based on *Figure 4-17: Delta-01 Views and Ownership*, focus on protecting views in areas where privately owned land is located within the close views as indicated on the diagram. These are mainly located in Sections 9, 15, and 16.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-01 Vegetation Recommendations, Treatment Alternative 2:

- In order to eliminate the encroachment of vegetation in gravel areas within the historic core, install asphalt pavement under the existing gravel surface and then cover the pavement with a minimum of six inches of gravel. The result will be a surface that looks like the historic surface, but does not require frequent use of herbicides or regular applications of gravel in order to maintain the bare look that was present during the period of significance.
- *Alternatively, apply approved herbicide as needed to control weeds on the site and supplement the gravel in areas that are thin, adding enough so the gravel surface is at least six inches thick.

Delta-01 Small Scale Features Recommendations, Treatment Alternative 2:

Table 6-5: Delta-01 Small Scale Landscape Features, Treatment Alternative 2

Small Scale Features	Treatment Alternative 2
Hardened high frequency transmit antenna (HS 104, IDLCS 100480)	**Preserve*
Hardened high frequency receive antenna (HS 105, IDLCS 100481)	**Preserve*
Hardened ultra-high frequency antenna (HS 106, IDLCS 100483)	**Preserve*
Survivable low frequency communication system antenna (HS 107, IDLCS 100484)	**Preserve*
Cathodic protection rectifier (HS 110, IDLCS 100485)	**Preserve*
Two sewage lagoons (HS 108, IDLCS 100486)	**Preserve*
Helicopter pad (HS 109, IDLCS 100485)	**Preserve*
ICBM super-high frequency satellite terminal antenna	**Preserve if Contributing (discuss with NPS staff) consider removing if non-contributing*

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Television satellite dish (HS 121, IDLCS 398298)	**Preserve*
HICS	**Preserve*
Security fencing (HS 113, IDLCS 287263)	**Preserve*
Sewage lagoon fencing / Livestock fencing	**Preserve*
Cattle-guard	**Preserve*
Electric fence	**Remove. Add livestock fencing that matches the fences around the sewage lagoons. If necessary, provide a gate at the rancher's easement.*
Historic signage (HS 117, IDLCS 354856)	**Preserve*
Protective bollards (HS 116, IDLCS 354857)	**Preserve*
Access road and parking area (HS 119, IDLCS 390289)	**Preserve*
Well and water tanks (HS 118, IDLCS 354851)	**Preserve*
Flagpole (HS 120, IDLCS 398270)	**Preserve*
Basketball goal (HS 112, IDLCS 287625)	**Preserve*
Volleyball court (HS 115, IDLCS 287266)	**Preserve*
Horseshoe court (HS 114, IDLCS 287261)	**Preserve*
Code burner (HS 111, IDLCS 287264)	**Preserve*
Interpretive wayside	*Relocate to new parking lot on east side of County Road CS23A.*
Portable toilet	*Remove. Replace with small comfort station on the east side of County Road CS23A.*
Concrete pad, transformer, and generator	*Consider relocating to a site that is not as visible to visitors.*
Cell tower	**Work with SHPO to encourage property owner to remove the tower.*
Ranch	**Work with property owner to preserve the character of the ranch and views of the ranch from Delta-01.*

Delta-01 Buildings and Structures Recommendations, Treatment Alternative 2:

Launch Control Support Building

The Launch Control Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the buildings and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

Launch Control Support Building Exterior:

- *At the time the asphalt apron adjacent to the south foundation wall needs to be replaced, the grade should be adjusted to slope away from the building.
- *Miscellaneous metal brackets from the old security system, abandoned wiring, and abandoned conduit should be removed from the metal siding and the anchorage holes repaired with an epoxy made for steel and painted to match the siding color.
- *Repair the security light at door #13, south elevation.
- *Remove the damaged and non-functioning speaker at door #13 and repair anchorage holes, south elevation.
- *Replace extant louver back into the opening in the north wall of Equipment Room 106. Block of the back of the louver if air is not required to be drawn into the room.
- *All cracked and damaged vinyl glazing stops should be replaced on the exterior face of all windows.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

- *All damaged or missing metal door holders should be replaced with new to match the original one still extant.

Launch Control Support Building Interior:

- *Generator Room 105: Repair water damaged drywall at the roof ventilator duct.
- *Women's Latrine 116A: The hole in the floor of the vinyl shower stall should be repaired with epoxy filler tinted to match the color of the stall.

Mechanical, Electrical, and Plumbing Systems

- *No treatment recommendations required. If other systems such as geothermal for heating and cooling or a variable refrigerant flow heat pump system are to be considered, it would entail major remodeling of the existing building.

Launch Control Center

- *No treatment recommendations required.

Vehicle Heated Storage Building

- *Exterior: No treatment recommendations required.
- *Interior: No treatment recommendations required.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

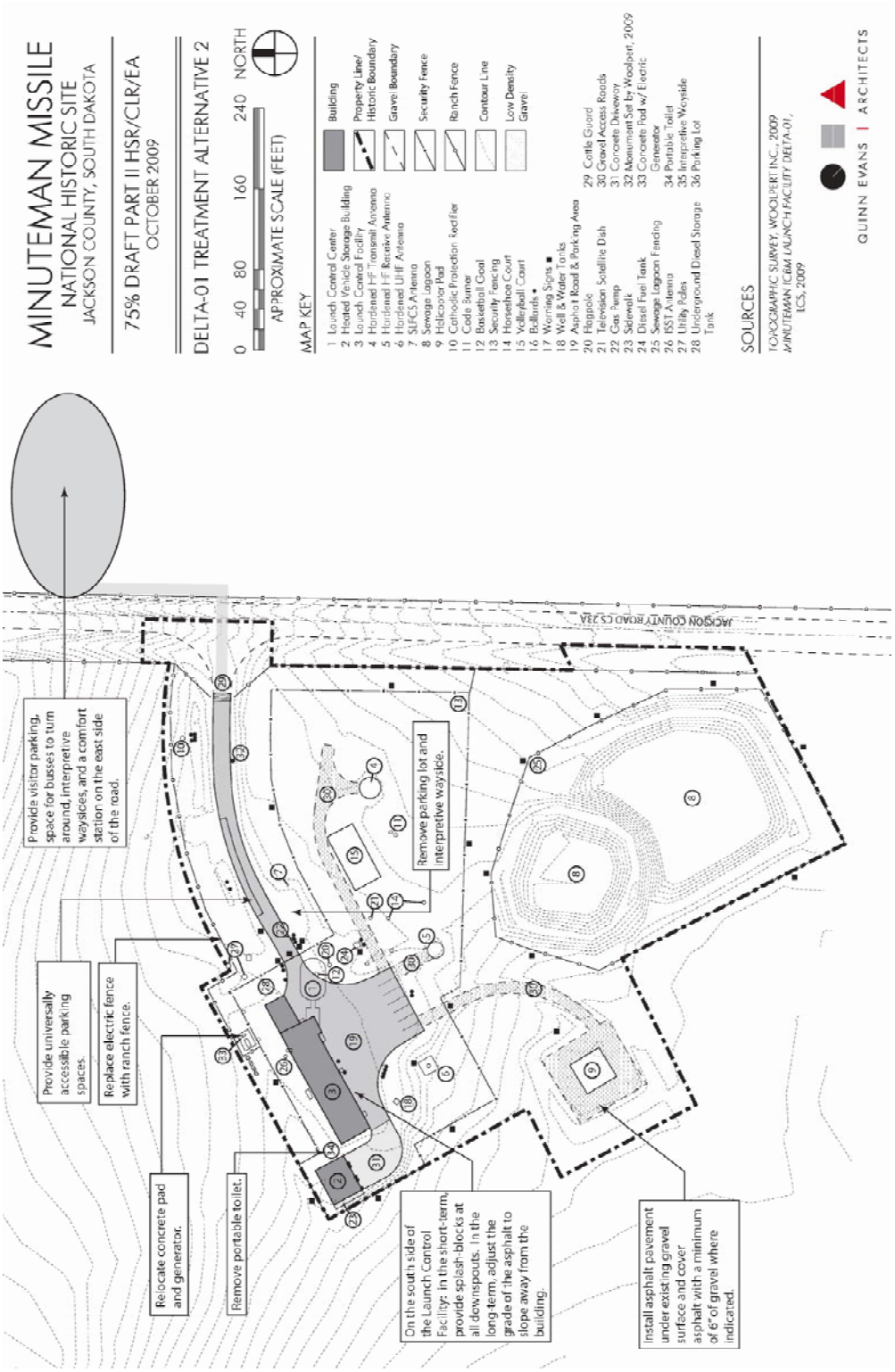
Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Next page:

Figure 6-3: Delta-01 Treatment Alternative 2


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
75% DRAFT PART II HSR/CLR/EA
OCTOBER 2009
DELTA-01 TREATMENT ALTERNATIVE 2
0 40 80 160 240 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards
17 Warning Signs
18 Well & Water Tanks
19 Asphalt Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Portable Toilet
35 Interpretive Wayside
36 Parking Lot
Building
Property Line/ Historic Boundary
Grave Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel
SOURCES
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA-01, ICS, 2009
QUINN EVANS | ARCHITECTS
JACKSON COUNTY ROAD CS 234
Provide visitor parking, space for busses to turn around, interpretive waysides, and a comfort station on the east side of the road.
Provide universally accessible parking spaces.
Replace electric fence with ranch fence.
Relocate concrete pad and generator.
Remove portable toilet.
Remove parking lot and interpretive wayside.
On the south side of the Launch Control Facility: in the short-term, provide splash-blocks at all downspouts. In the long-term, adjust the grade of the asphalt to slope away from the building.
Install asphalt pavement under existing gravel surface and cover asphalt with a minimum of 6" of gravel where indicated.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09, Treatment Alternative 2

Delta-09 Spatial Organization Recommendation, Treatment Alternative 2:

- *Develop a landscape management plan that addresses site needs.

Delta-09 Land Use Recommendations, Treatment Alternative 2:

- *Remove the portable toilet from within the historic core.
- Provide a visitor parking lot and an interpretive wayside outside the historic boundary.
- Provide a small comfort station near the parking lot.

Delta-09 Circulation Recommendations, Treatment Alternative 2:

- Acquire land to the east of the site, on the eastern side of Pennington County Road T512 to use for a visitor parking area with fifteen car parking spaces and five spaces for recreational vehicles.
- At the new parking area, include adequate space for busses and recreational vehicles to turn around.
- *Allow visitors with mobility impairments to park on the access road near the security gate (universally accessible parking).
- *Provide a universally accessible route into the site and to the viewing enclosure from the universally accessible parking area. *Find out what type of gravel was used during the POS. Add a layer of crushed stone over the existing surface. Match the color of the stone to that present during the

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

period of significance. Use crushed stone and compact it to achieve a universally accessible surface.

Delta-09 Topography and Views Recommendations, Treatment Alternative 2:

- *Work with adjacent landowners to develop agreements to protect significant views. Consider purchasing scenic easements to achieve this goal.
    - Based on *Figure 4-14: Delta-09 Existing Views and Ownership*, focus on protecting views in areas where privately owned land is located within the close views as indicated on the diagram.
    - If possible, also address the privately owned property located in Section 15 that is within the far views of Delta-09, as indicated in Figure 4-14.
- *Monitor the area at the south side of the historic core that has had erosion problems. Continue to maintain positive drainage away from the historic resources.

Delta-09 Vegetation Recommendations, Treatment Alternative 2:

- *Determine the type of gravel that was present during the period of significance, and apply a minimum six inch layer of gravel in areas that are not identified as part of the universal access route.

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

- *If necessary, apply approved herbicide as needed to control weeds on the site.

Delta-09 Small Scale Features Recommendations, Treatment Alternative 2:

Table 6-6: Delta-09 Small Scale Landscape Features, Treatment Alternative 2

Small Scale Features	Treatment Alternative 2
Glass viewing enclosure	**Maintain*
Improved Minuteman Physical Security System (IMPSS) antenna (HS 903, IDLCS 100489)	**Preserve*
Hardened UHF antenna (HS 904, IDLCS 100491)	**Preserve*
Cathodic protection rectifier (HS 912, IDLCS 390310)	**Preserve*
Two azimuth markers (HS 905, IDLCS 100492)	**Preserve*
Two HICS marker posts (HS 907, IDLCS 345796)	**Preserve*
Security fence (HS 906, IDLCS 295903)	**Preserve*
Light posts (HS 908, IDLCS 354853)	**Preserve*
Bollard (HS 909, IDLCS 354859)	**Preserve*
Helipad & Markers (HS 910, IDLCS 354855)	**Preserve*
Access Road and Maneuvering Area (HS 911, IDLCS 390310)	**Preserve*
Antenna piers (HS 913, IDLCS 400831)	**Preserve*
Transporter erector pylons (HS 914, IDLCS 412538)	**Preserve*
Launch facility warning signs	**Preserve*
Culvert	**Maintain*
Drainage ditch	**Maintain*
Portable toilet	*Remove- replace with small comfort station at visitor parking area.*

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Buildings and Structures Recommendations, Treatment Alternative 2:

Delta-09 Launch Facility

The Launch Facility is in very good condition due to the cyclical maintenance provided by the Air Force personnel from Ellsworth Air Force Base and the National Park Service. With the exception of the cathodic protection system, the following treatment recommendations are not critical to the overall health of the structures and can be incorporated into the on-going cyclical maintenance of the facilities as funding is available.

- *Replace caulking at the perimeter edge of the steel personnel access hatch.

Delta-09 Launch Facility Structural Recommendations

- *General Concrete: The silo apron slabs show surface deterioration and a penetrating, breathable sealant/consolidant is recommended below to mitigate this aging. Other surfaces such as the vault topping slab and silo retaining walls do not show the same surface deterioration; however, application of such a sealant should be considered for those elements.

Delta-09 Launch Facility Equipment Vault Structural Recommendations

- *Topping Slab: Previous attempts to patch the cracking in the topping slab appear to have been unsuccessful as the patch has worn off or is gone. These cracks should be sealed with an epoxy injection if possible. There are limits to minimum crack width that injection systems can fill. Some chemical companies (SIKA) promote gravity feed epoxy products which

Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

may be applicable for fine cracks. If the cracks are too fine for either injection or gravity feed then the cracks should be routed out and filled with a modified epoxy gel.

- *Walls: Fine cracks were noted in the exterior walls exposed above grade. These should be either epoxy injected or filled as with the slab above.

Delta-09 Launch Facility Silo Structural Recommendations

- *Apron Slabs: These slabs show signs of spalling and cracking. Cracks should be sealed by epoxy injection. Loose spall should be removed and patched with an epoxy modified cementitious patching material. It is important to undercut the edges of patching areas as patching materials should not be feathered at the edges. A good penetrating sealant/consolidant (such as Prosoco H40) should be applied to the exposed surface to minimize weathering deterioration. The sealant should not entrap moisture within the concrete.

- *Minor Retaining Wall Cracks: Cracking should be sealed by injection or routing and patching as discussed for the vault slab.

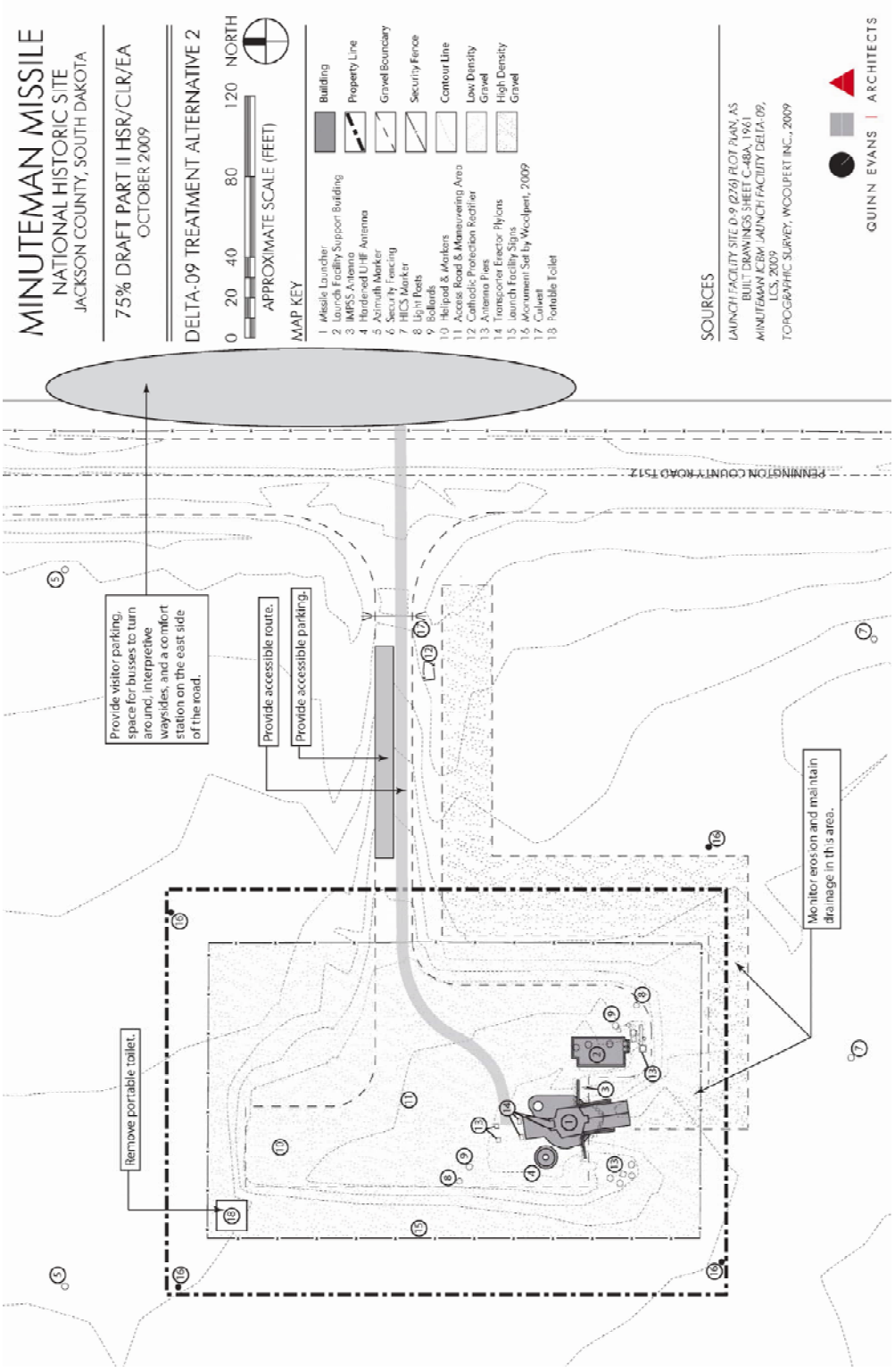
Minuteman Missile National Historic Site
Historic Structures Report/Cultural Landscape Report/Environmental Assessment

Delta-09 Launch Facility Cathodic Protection System

- *A new cathodic protection system should be installed. The current design and location of the system is adequate, and the location and number of anodes should be retained.

Next page:

Figure 6-4: Delta-09 Treatment Alternative 2


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
75% DRAFT PART II HSR/CLR/EA
OCTOBER 2009
DELTA-09 TREATMENT ALTERNATIVE 2
0 20 40 80 120 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPASS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Poles
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Pads
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
SOURCES
LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
QUINN EVANS | ARCHITECTS
PENNINGTON COUNTY ROAD T512
Provide visitor parking, space for busses to turn around, interpretive waysides, and a comfort station on the east side of the road.
Provide accessible route.
Provide accessible parking.
Monitor erosion and maintain drainage in this area.
Remove portable toilet.

March 2010 Project Workshop Agenda

9 March 2010

MEMORANDUM

From: BRENDA WILLIAMS

To: MARLA MCENANEY, MWRO
BILL HARLOW, MWRO
MIKE HOSKING, MIMI
PAM GRISWOLD, MIMI
JOHN BLACK, MIMI
AL O'BRIGHT, MWRO
STEVE JONES, QEA
WILL BALLARD, WOOLPERT
TONYA BRADLEY, MWRO

QUINN EVANS ARCHITECTS
1037 SHERMAN AVENUE
MADISON, WI 53703
608 260 8020

RE: HSR/CLR/EA
MINUTEMAN MISSILE NATIONAL HISTORIC SITE
PHILLIP, SD
Q6068080035
PN 08119.01

Subject: PROJECT WORKSHOP AGENDA

Tuesday March 9 Project team travels to South Dakota.

Wednesday March 10

8:30am Set up for project workshop

9:00am – noon Project Workshop at Park HQ

9:00-10:00am
- Introductions
- Overview of project to date (BW)
- Purpose and Need Statements – discuss and update (BW)
- Project Goals (BW)
- Discuss consultation and PEPC (MM and WB)

10:00am – noon
- Project Vision Alternatives & alternative materials treatment philosophy (BW & SJ)
- Draft Site Vision, Program and Design Alternatives (BW)
  - Alt #1
  - Alt#2
  - Alt#3
- Recommendations for preserving views (BW)
- Discuss Landscape Alternatives & Select/Develop Preferred Approach (all)
- Review Management Issues (BW & SJ)
  - Clarify existing and desired parking within fences at Delta-01 and Delta-09.

Noon-1:00pm Lunch

Afternoon Consultants work independently

- BW update alternatives and develop preferred landscape plan
- SJ site work at Delta-01

WASHINGTON, DC
ANN ARBOR, MI
MADISON, WI

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9 March 2010
Page 2 of 2

Thursday March 11

9:00am -noon Workshop attendees meet at HQ

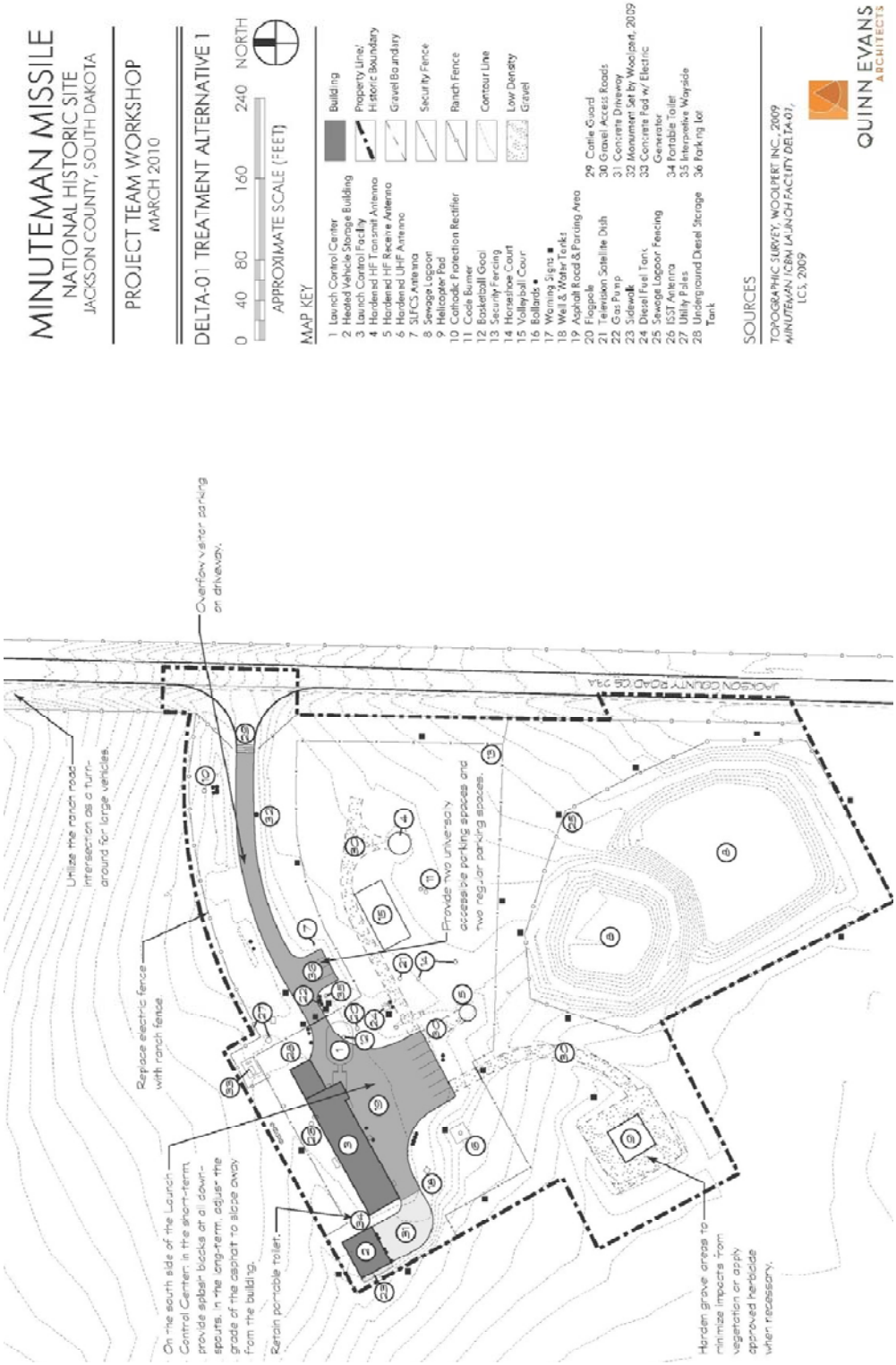
- Review revised landscape alternatives (BW)
- Review revised landscape preferred approach (BW)
- Project schedule (BW & SJ)
- Review impact topics (WB)
- Questions related to review comments (BW, SJ, WB)
  - Cathodic Protection Systems
    - Existing conditions – functioning?
    - Recommendations – repair or replacement options with pros and cons of both treatments?
  - Repetition of information from alternative to alternative. How to simplify?
  - What is the status of the Missileers oral history project?
  - Explain character-defining features, contributing, and non-contributing.
- Review options for report cover (BW)

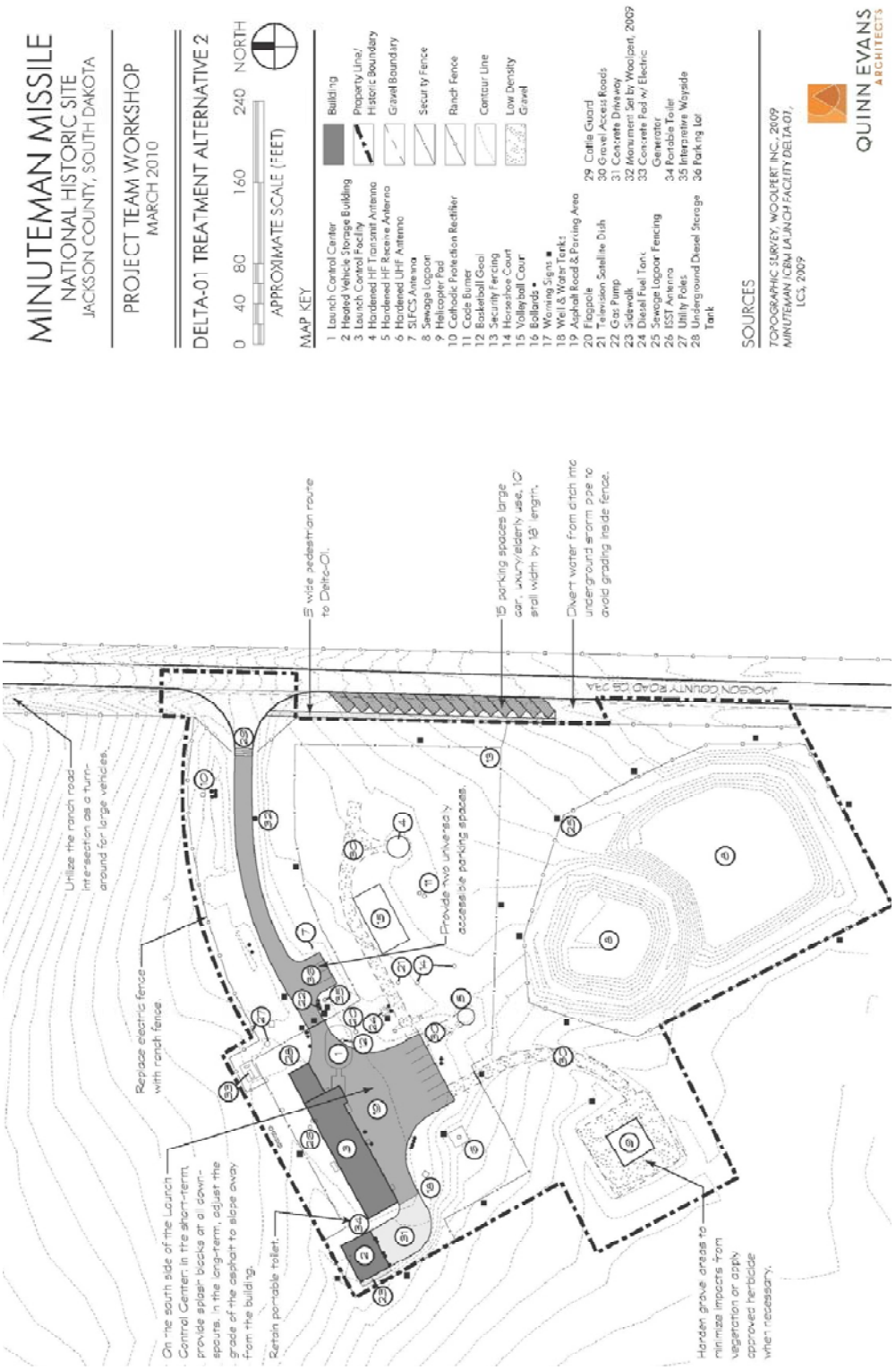
Noon Project team departs

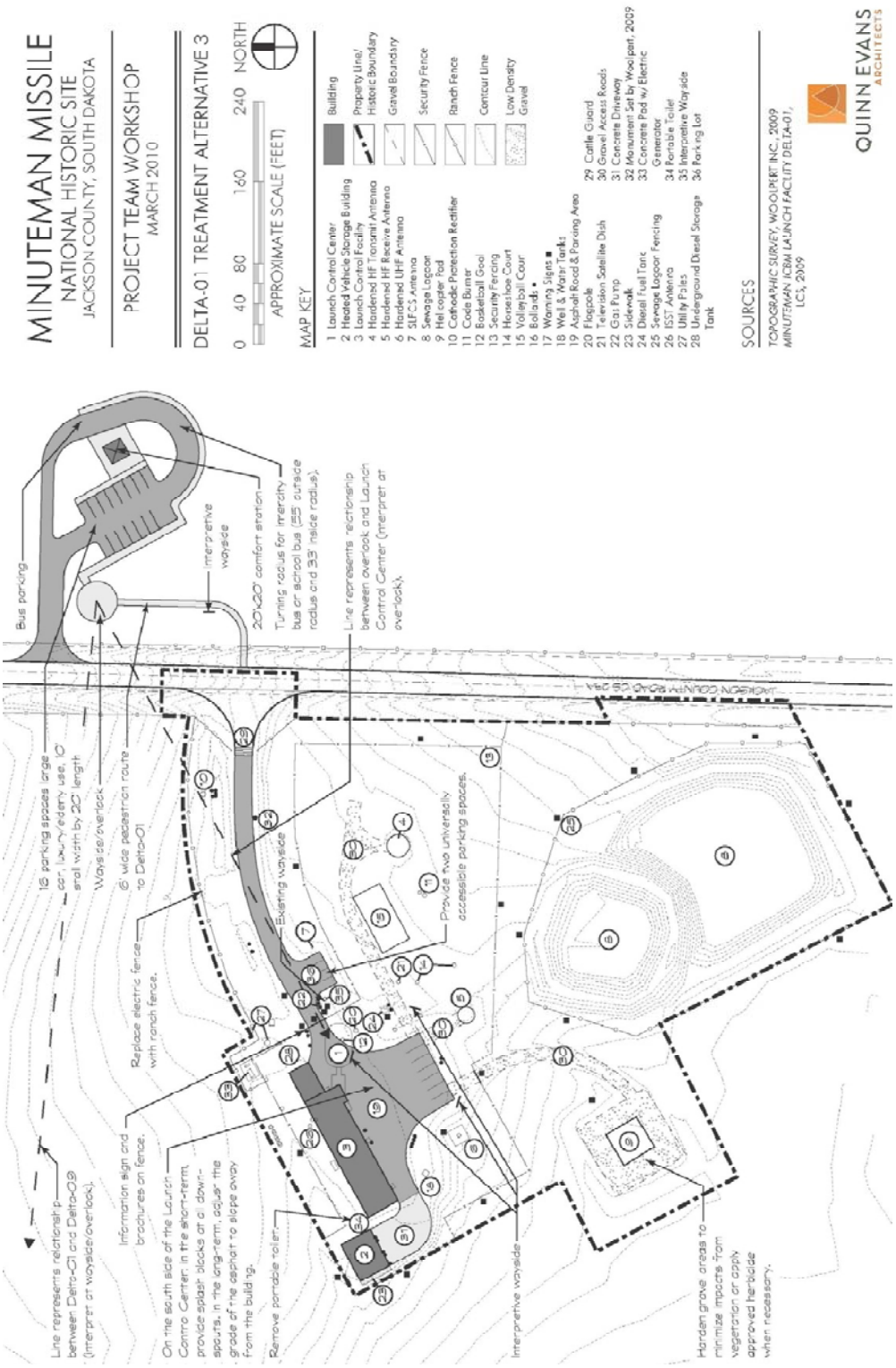
END OF MEMORANDUM

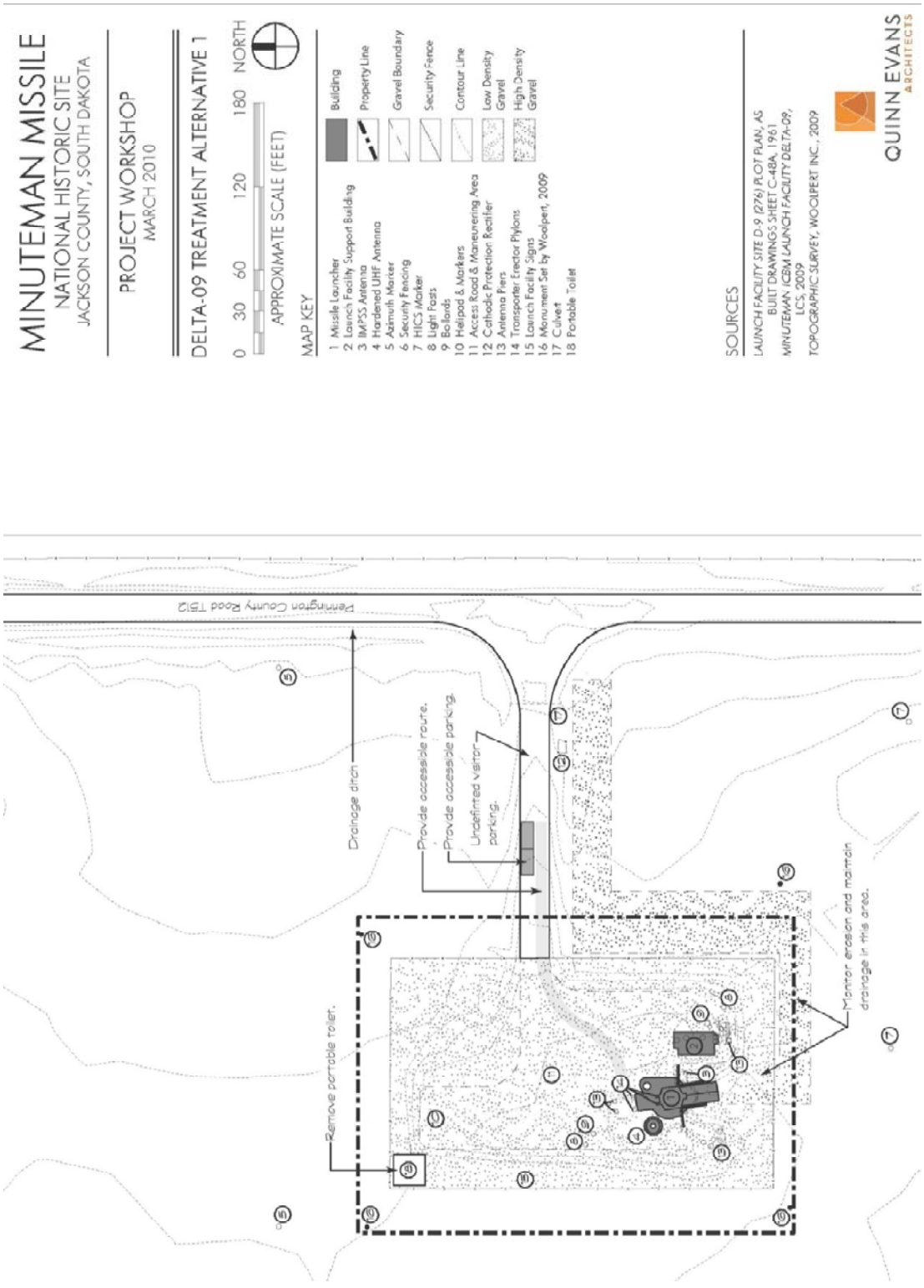
QUINN EVANS ARCHITECTS

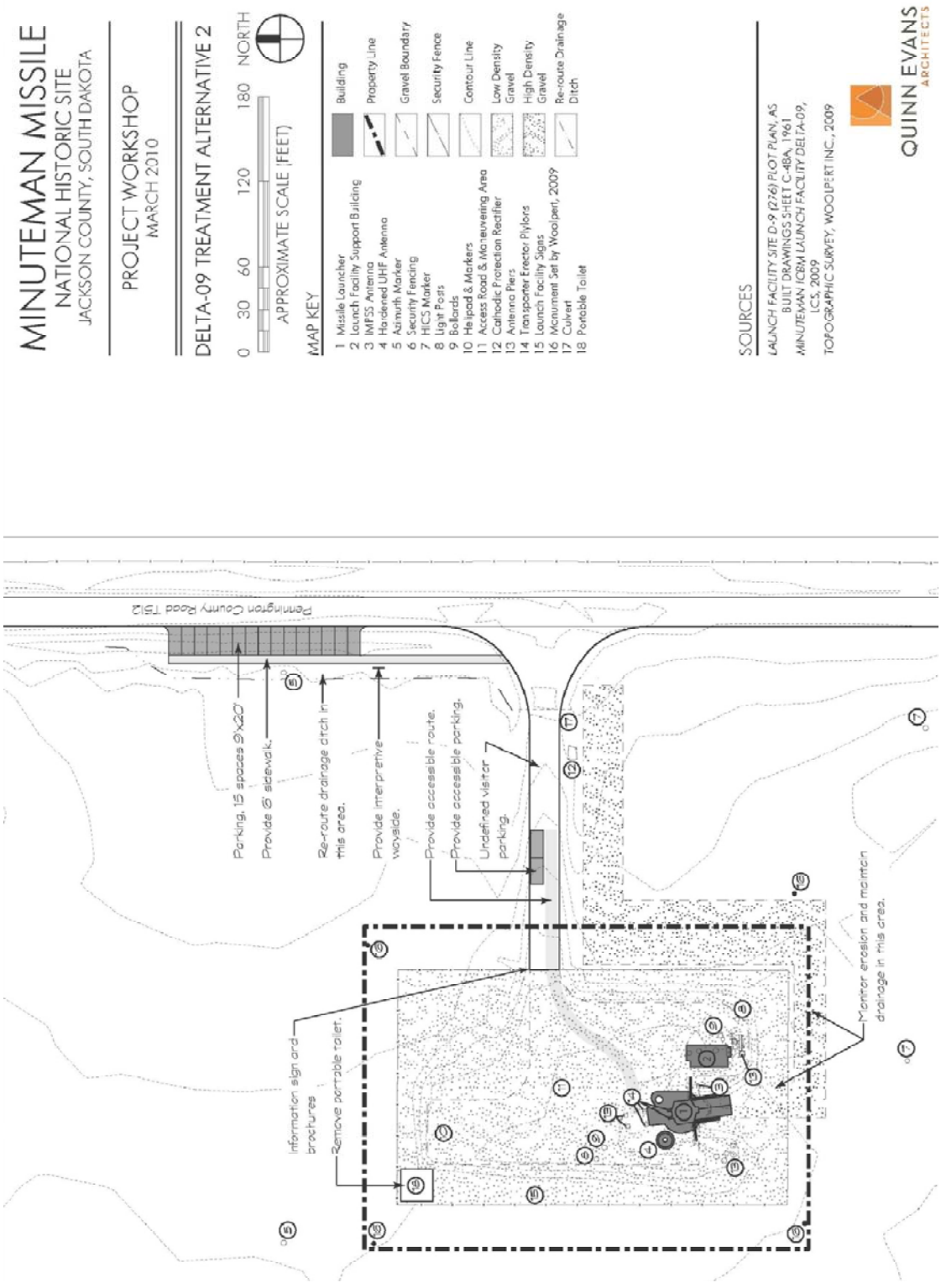
March 2010 Project Workshop Treatment Alternatives

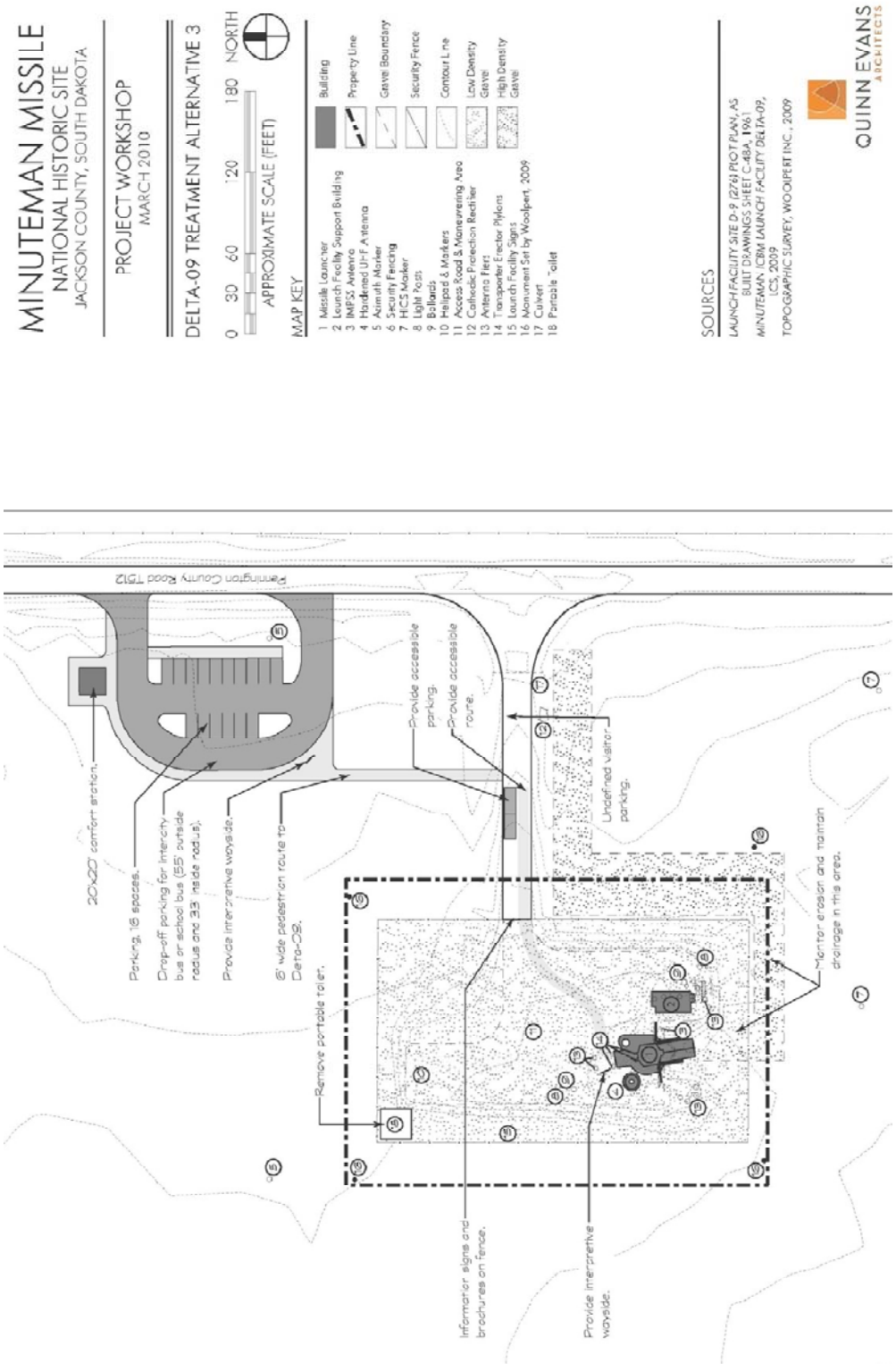


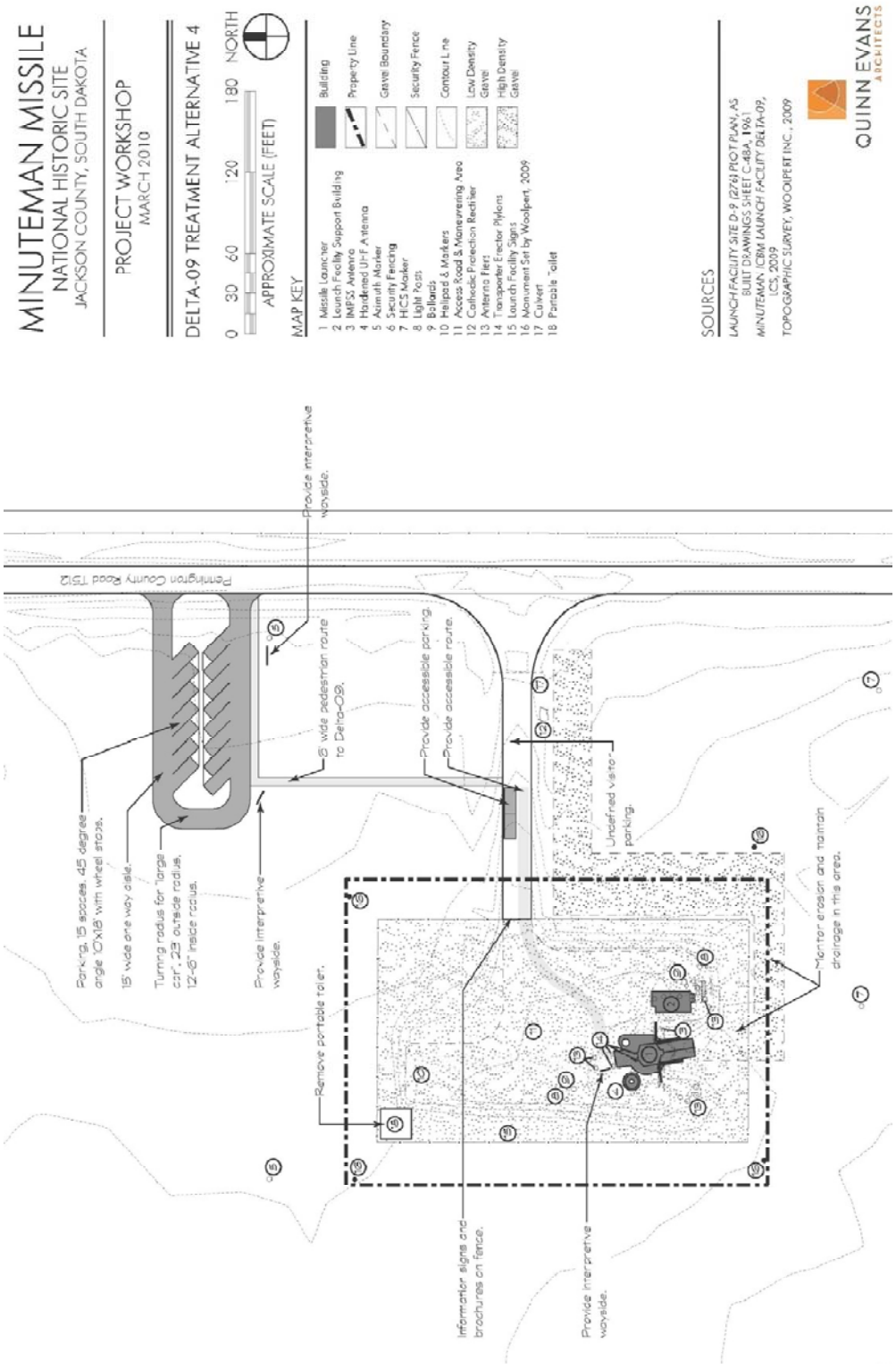

MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT TEAM WORKSHOP
MARCH 2010
DELTA-01 TREATMENT ALTERNATIVE 2
0 40 80 160 240 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards
17 Warning Signs
18 Well & Water Tanks
19 Asphalt Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Portable Toilet
35 Interpretive Wayside
36 Parking Lot
Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel
SOURCES
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ICBM LAUNCH FACILITY DELTA 01, LCS, 2009
QUINN EVANS ARCHITECTS
5' wide pedestrian route to Delta-01.
15 parking spaces large car, van/elderly use, 10' stall width by 18' length.
Divert water from ditch into underground storm pipe to avoid grading inside fence.
JACKSON COUNTY ROAD 1 (SD 34)
Utilize the ranch road intersection as a turn-around for large vehicles.
Replace electric fence with ranch fence.
Provide five universally accessible parking spaces.
On the south side of the Launch Control Center, in the short-term, provide splash blocks at downspouts. In the long-term, adjust the grade of the asphalt to slope away from the building.
Retain portable toilet.
Harden grave areas to minimize impacts from vegetation or apply approved herbicide when necessary.


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT TEAM WORKSHOP
MARCH 2010
DELTA-01 TREATMENT ALTERNATIVE 3
0 40 80 160 240 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Launch Control Center
2 Heated Vehicle Storage Building
3 Launch Control Facility
4 Hardened HF Transmit Antenna
5 Hardened HF Receive Antenna
6 Hardened UHF Antenna
7 SLFCS Antenna
8 Sewage Lagoon
9 Helicopter Pad
10 Cathodic Protection Rectifier
11 Code Burner
12 Basketball Goal
13 Security Fencing
14 Horseshoe Court
15 Volleyball Court
16 Bollards
17 Warning Signs
18 Well & Water Tanks
19 Asphalt Road & Parking Area
20 Flagpole
21 Television Satellite Dish
22 Gas Pump
23 Sidewalk
24 Diesel Fuel Tank
25 Sewage Lagoon Fencing
26 ISST Antenna
27 Utility Poles
28 Underground Diesel Storage Tank
29 Cattle Guard
30 Gravel Access Roads
31 Concrete Driveway
32 Monument Set by Woolpert, 2009
33 Concrete Pad w/ Electric Generator
34 Portable Toilet
35 Interpretive Wayside
36 Parking Lot
Building
Property Line/ Historic Boundary
Gravel Boundary
Security Fence
Ranch Fence
Contour Line
Low Density Gravel
SOURCES
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
MINUTEMAN ACBM LAUNCH FACILITY DELTA-01, LCF, 2009
QUINN EVANS ARCHITECTS
Bus parking
16 parking spaces, large car, 1 van/elderly use, 10' small width by 20' length
Wayside/overlook
6' wide pedestrian route to Delta-01
Interpretive wayside
20'x20' comfort station
Turning radius for intercity bus or school bus (55' outside radius and 33' inside radius).
Line represents relationship between overlook and Launch Control Center (interpret at overlook).
Existing wayside
Provide two universally accessible parking spaces.
Replace electric fence with ranch fence.
Information sign and brochures on fence.
On the south side of the Launch Control Center, in the short-term, provide splash blocks at all downspouts, in the long-term, adjust the grade of the asphalt to slope away from the building.
Remove portable toilet.
Line represents relationship between Delta-01 and Delta-09 (interpret at wayside/overlook).
Interpretive wayside
Harden grove areas to minimize impacts from vegetation or apply approved herbicide when necessary.


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT WORKSHOP
MARCH 2010
DELTA-09 TREATMENT ALTERNATIVE 1
0 30 60 120 180 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woodpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
SOURCES
LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-48A, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOODPERT INC., 2009
QUINN EVANS ARCHITECTS
Pennington County Road 1512
Drainage ditch
Provide accessible route.
Provide accessible parking.
Undefined visitor parking.
Remove portable toilet.
Monitor erosion and maintain drainage in this area.


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT WORKSHOP
MARCH 2010
DELTA-09 TREATMENT ALTERNATIVE 2
0 30 60 120 180 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HICS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Piers
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
Re-route Drainage Ditch
SOURCES
LAUNCH FACILITY SITE D-9 (276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-4BA, 1961
MINUTEMAN ICBM LAUNCH FACILITY DELTA-09, LCS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
QUINN EVANS ARCHITECTS
Pennington County Road T512
Parking, 15 spaces 9'x20'
Provide 6' sidewalk.
Re-route drainage ditch in this area.
Provide interpretive wayside.
Provide accessible route.
Provide accessible parking.
Undefined visitor parking.
Information sign and brochures
Remove portable toilet.
Monitor erosion and maintain drainage in this area.


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT WORKSHOP
MARCH 2010
DELTA-09 TREATMENT ALTERNATIVE 3
0 30 60 120 180 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HCS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Mast
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
SOURCES
LAUNCH FACILITY SITE D-9 (2276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-4BA, 1961
MINUTEMAN ICBM LAUNCH FACILITY Delta-09, ICS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
QUINN EVANS ARCHITECTS
Pennington County Road 1512
20x20 concrete section.
Parking, 16 spaces.
Drop-off parking for intercity bus or school bus (55' outside radius and 33' inside radius).
Provide interpretive wayside.
6' wide pedestrian route to Delta-09.
Provide accessible parking.
Provide accessible route.
Undefined visitor parking.
Remove portable toilet.
Mentor erosion and maintain drainage in this area.
Information signs and brochures on fence.
Provide interpretive wayside.


MINUTEMAN MISSILE
NATIONAL HISTORIC SITE
JACKSON COUNTY, SOUTH DAKOTA
PROJECT WORKSHOP
MARCH 2010
DELTA-09 TREATMENT ALTERNATIVE 4
0 30 60 120 180 NORTH
APPROXIMATE SCALE (FEET)
MAP KEY
1 Missile Launcher
2 Launch Facility Support Building
3 IMPSS Antenna
4 Hardened UHF Antenna
5 Azimuth Marker
6 Security Fencing
7 HCS Marker
8 Light Posts
9 Bollards
10 Helipad & Markers
11 Access Road & Maneuvering Area
12 Cathodic Protection Rectifier
13 Antenna Mast
14 Transporter Erector Pylons
15 Launch Facility Signs
16 Monument Set by Woolpert, 2009
17 Culvert
18 Portable Toilet
Building
Property Line
Gravel Boundary
Security Fence
Contour Line
Low Density Gravel
High Density Gravel
SOURCES
LAUNCH FACILITY SITE D-9 (2276) PLOT PLAN, AS BUILT DRAWINGS SHEET C-4BA, 1961
MINUTEMAN ICBM LAUNCH FACILITY Delta-09, ICS, 2009
TOPOGRAPHIC SURVEY, WOOLPERT INC., 2009
QUINN EVANS ARCHITECTS
Pennington County Road 1512
Provide interpretive wayside.
6' wide pedestrian route to Delta-09.
Provide accessible parking.
Provide accessible route.
Unofficial visitor parking
Parking, 15 spaces, 45 degree angle 10'X18' with wheel stops.
15' wide one way aisle.
Turning radius for large car, 23' outside radius, 12'-6" inside radius.
Provide interpretive wayside.
Remove portable toilet.
Monitor erosion and maintain drainage in this area.
Information signs and brochures on fence.
Provide interpretive wayside.

March 2010 Project Workshop Notes

7 April 2010

MEMORANDUM

From: BRENDA WILLIAMS

To: MARLA MCENANEY, MWRO
BILL HARLOW, MWRO
MIKE HOSKING, MIMI
PAM GRISWOLD, MIMI
JOHN BLACK, MIMI
AL O'BRIGHT, MWRO
STEVE JONES, QEA
WILL BALLARD, WOOLPERT
TONYA BRADLEY, MWRO
NICK CHEVANCE, MWRO

RE: HSR/CLR/EA
MINUTEMAN MISSILE NATIONAL HISTORIC SITE
PHILLIP, SD
Q6068080035
PN 08119.01

Subject: PROJECT WORKSHOP NOTES

QUINN EVANS ARCHITECTS
1037 SHERMAN AVENUE
MADISON, WI 53703
608 260 8020

WASHINGTON, DC
ANN ARBOR, MI
MADISON, WI

WWW.QUINNEVANS.COM

A project workshop was held at park headquarters on 9 March 2010. In attendance on 9 March were: Mike Hosking, Pam Griswold, Marla McEnaney, Bill Harlow, Al O'Bright, Steve Jones, Will Ballard, and myself. Although the workshop was scheduled to continue at park headquarters on 10 March, dangerous road conditions caused a change in plans. Members of the project team met in Rapid City to complete the workshop agenda. Participants on 10 March included: Mike Hosking, Marla McEnaney, Bill Harlow, Al O'Bright, Steve Jones, Will Ballard, and myself.

The following topics were discussed:

- **Purpose and Need Statements**
  - The 75% draft covered "purpose" but not need.
  - The goals summarized below address "need:"
    - Preserve the integrity of the cultural resources in the park.
    - Improve the visitor experience at the park.
    - Provide expanded facilities for visitors.
    - Enhance interpretive opportunities related to the historic resources.

- **Project objectives were reviewed and refined to include the following:**
  - Part I Objectives
    1. Evaluation of viewsheds from and to Delta-01 and Delta-09.
    2. Assessment of conditions of modern building materials and systems.
    3. Documentation of physical changes that illustrate shifting responses to military technology. Include documentation of phases of physical change to the landscapes and buildings.
    4. Identification of missing features.
    5. Identification of changes in paint schemes and interior/exterior finishes and small scale features such as security elements, antennae, structures and fence configurations.
    6. Identify contributing and non-contributing landscape characteristics.
  - Part II Objectives
    1. Recommended approach for site interpretation, including placement of wayside exhibits and site signage.

2. Development of schematic site planning for providing visitor services (including universal access, parking, pedestrian circulation, and restroom facilities).
3. Recommendations for addressing missing building or landscape features.
4. Recommended approach(es) for maintaining or replacing mid to late 20th century building materials and systems.
5. Recommended method for maintaining historic HVAC and Cathodic protection systems.
6. Recommendations for paint schemes and interior/exterior finishes and treating small scale features such as security elements, antennae, structure and fence configurations.
7. Recommendations for protecting significant views.
8. Recommendations for vegetation management and control.
9. Recommendations for erosion control at Delta-01 and drainage at Delta-09.
10. Recommendations for interpreting the overall missile project, other missile sites and the historic connection between Delta-01 and Delta-09.

QUINN EVANS ARCHITECTS

- **Consultation and PEPC**
  - The group agreed that the list of stakeholders from the GMP is a good starting place for the current project.
  - Will Ballard touched base with Nick Chevance to find out if review should be conducted the same as for the GMP, or if it can be condensed. Nick indicated that park staff members need to go through the list and determine which parties need to be contacted in regard to this specific project.
  - The park will consider putting a link to PEPC on the park web site when the report is out for public review.
  - Review copies at 95% should be shared by NPS with:
    - SHPO
    - Air Force – Tim Pavek
  - Notifications for the public review should be sent to the following (with cover letter from NPS):
    - National Grassslands- Mike to contact
    - Air Force (museum and base historian, Tim Pavek)
    - Fish & Wildlife- Woolpert has provided a draft letter and contact name to Mike Hosking so that the letter can be sent from the park.
    - State listed species- online data request is being conducted by Woolpert
    - SHPO – Mike will touch base with them ahead of time
    - Tribal groups—GMP provides basis--Will talked to Nick—park should send letters to all of the tribes that were contacted for the GMP.
    - Archeology –Marla will touch base with Steve Devore to let him know this project will be coming through for review. (in recommendations, make sure to include a note recommending that either archeological investigations be conducted prior to construction, or an archeologist be on site during earth moving activities).

- **Alternative materials treatment philosophy**
  - Need to include a list of character defining materials for buildings—indicating each item that must be replaced in-kind (examples: mechanical units, elevator, …).
  - For landscapes, list "landscape features" (NOT character defining features, as this gets confused with "landscape characteristics") indicating elements that must be replaced in-kind (examples: antennas, code burner, gas pump, gate…)

- **Draft Site Vision, Program and Design Alternatives**
  - Brenda Williams presented three site design alternatives for Delta-01 and four site design alternatives for Delta-09. The group discussed program needs for the sites, and the GMP recommendations.

- Park staff clearly communicated that no alternatives should include recommendations for purchase of land or easements unless specifically indicated in the GMP.
- On Thursday, the group agreed that only alternatives that fulfilled all of the program needs could be considered valid alternatives.
- As a result, the 95% draft report will include two alternatives for each site.
  - A current treatment/no action alternative will be included for both sites.
  - In addition, a preferred action alternative will be included for each site that provides all of the program requirements noted in the GMP, in the locations indicated in the GMP. These include (for both sites):
    - Universal accessibility
    - 15 parking spaces for large cars
    - Turn-around and drop-off for busses and recreational vehicles
    - Interpretive information outside the historic core
    - Small comfort station with vault toilet
- The previously considered alternatives that have been eliminated will be listed in the considered but rejected section of the report.

QUINN EVANS ARCHITECTS

- **View analysis**
  - The group agreed that the view analysis diagrams accurately illustrate views important to both sites.
  - The wording on the view recommendations diagram should be changed to eliminate recommendations for purchasing scenic easements for any locations not indicated in the GMP.

- **Project schedule:** was discussed and revised. A copy is included at the end of this memorandum.

- **Impact topics and Cumulative Actions were discussed**
  - Impact Topics
    - Archeology – group does not think we need to address, but Marla will call Steve Devore to touch base and see what he says. The one concern is that the construction of the parking lots may be considered a potential impact on archeological resources. Also, if extensive digging is required for the replacement of the cathodic protection system, this could make archeology an impact topic that needs to be addressed.
    - Paleoentological resources- the GMP did not address this topic, so the CLR should not have to. Will Ballard will touch base with a paleoentological expert to confirm.
    - Fox need to be addressed.
    - Two asbestos reports have been done, Mike Hosking will forward copies to Steve Jones.
    - No information/testing for lead paint has been conducted. This is not include in the project scope.
  - Cumulative Actions
    - Land protection plan - views
    - Potential for wind farms was discussed – Brenda will try to find out if any criteria exist for determine an area's potential for wind farm development.
    - Local roads issue (paving/maintenance)

- **Questions related to review comments were clarified.**

- **Options for report cover**
  - Four optional layouts for the report cover were reviewed and one was selected. It will be included as the cover on the 95% submittal.

END OF MEMORANDUM

Appendix D: Asbestos Surveys

EAFB
LAUNCH CONTROL FACILITY D-1

ASBESTOS SERVICES
ASBESTOS SURVEY
PROJECT NO. 92-7025-4
ELLSWORTH AFB, SOUTH DAKOTA

JANUARY 3, 1994

Prepared by

INTERMOUNTAIN TECHNICAL SERVICES, INC.

4447 SOUTH CANYON ROAD, SUITE #5

RAPID CITY, SOUTH DAKOTA

STATEMENT OF ACCREDITATION

The following document which is called the "Asbestos Assessment Report" was prepared by Mr. James Almond, acting in conjunction with INTERMOUNTAIN TECHNICAL SERVICES, INC.

Mr. Almond is qualified to perform all of the duties required of him as an Asbestos Inspector and Asbestos Management Planner. This is true by virtue of his satisfactory completion of the required EPA approved training courses, and by virtue of his certification as an Asbestos Inspector and Asbestos Management Planner in the State of South Dakota.

As the Asbestos Management Planner, Mr. Almond takes on the responsibility of providing the Federal Government with the appropriate statements of policy, and with the statements of information that are found in this document. Furthermore, Mr. Almond is the person who has made the recommended cost analysis.

As the Asbestos Inspectors, Mr. Almond and Mr. John Brothers inspected Launch Control Facility D-1 at Wall, South Dakota for asbestos-containing building materials from October 12, 1993 through November 2, 1993. Mr. Almond and Mr. Brothers did all the work involved in the inspection process, including the identification of the homogeneous areas, the taking of samples, the physical assessment of the material in the homogeneous areas and the assessment of potential exposure due to disturbance.

The State of South Dakota has adopted an accreditation program under Section 206 (b) of Title II of AHERA and any person or persons who inspect for ACBM and who will design or carry out response actions shall be required to be certified by the State of South Dakota and have successfully completed the appropriate training in accordance with ARSD 74:31.

Below please find the Signature of Management Planner.

Signed 

James Almond
Certificate #1345

Date 1-4-94

INSPECTION STATEMENT

Mr. James Almond and Mr. John Brothers, Certified AHERA Building Inspectors/ Management Planners, conducted an inspection of Launch Control Facility D-1. The inspection process began October 12, 1993, and was completed on November 2, 1993.

No exclusions have been declared as a result of any previous inspections, nor were any materials assumed to be Asbestos Containing Materials.

A review of the building plans and specifications was conducted. A walk-through inventory was also performed. The review and walk- through inspection resulted in the identification of the Homogeneous Areas Inventory. Samples of identified materials were randomly taken and a homogeneous physical assessment report was prepared.

The complete Inspection Report is included as a part of the final report.

LETTER OF TRANSMITTAL

INSPECTOR'S NAME, ADDRESS AND CERTIFICATE NUMBER:

#1 JAMES ALMOND, INTERMOUNTAIN TECHNICAL SERVICES, 4447 SOUTH CANYON ROAD, SUITE #5, RAPID CITY, SD, SD CERT 1471R

#2 JOHN BROTHERS, INTERMOUNTAIN TECHNICAL SERVICES, 4447 SOUTH CANYON ROAD, SUITE #5, RAPID CITY, SD, SD CERT 1346

INSPECTION DATA:

INSPECTION START DATE: October 12, 1993

INSPECTION COMPLETION DATE: November 2, 1993

OWNER INFORMATION:
(NAME ADDRESS AND PHONE NUMBER)

United States of America
Ellsworth Air Force Base
Ellsworth AFB, South Dakota

Civil Engineering Ph #: 1-605-385-2523

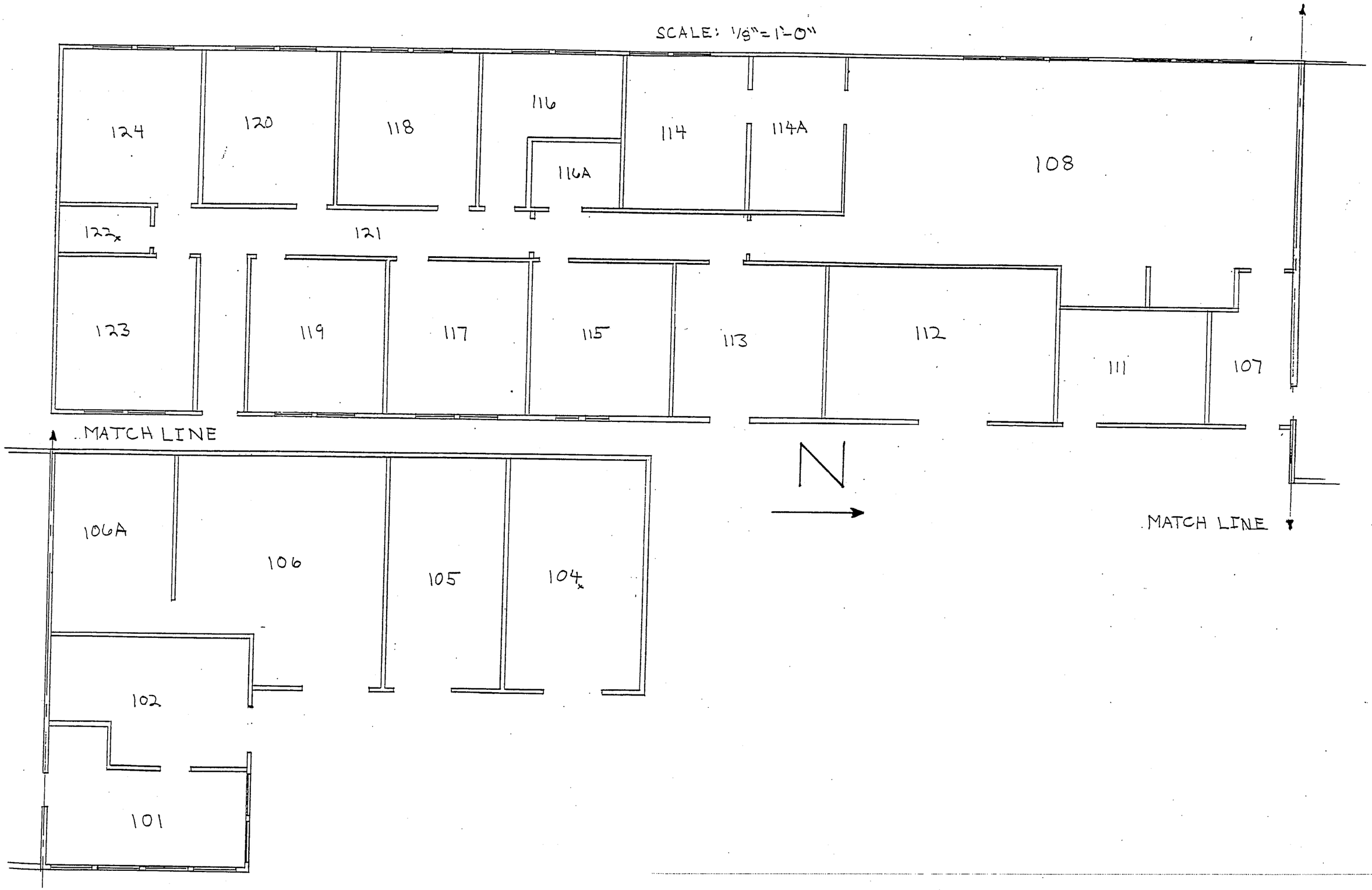
SIGNATURES:

INSPECTOR #1: _____

INSPECTOR #2: _____

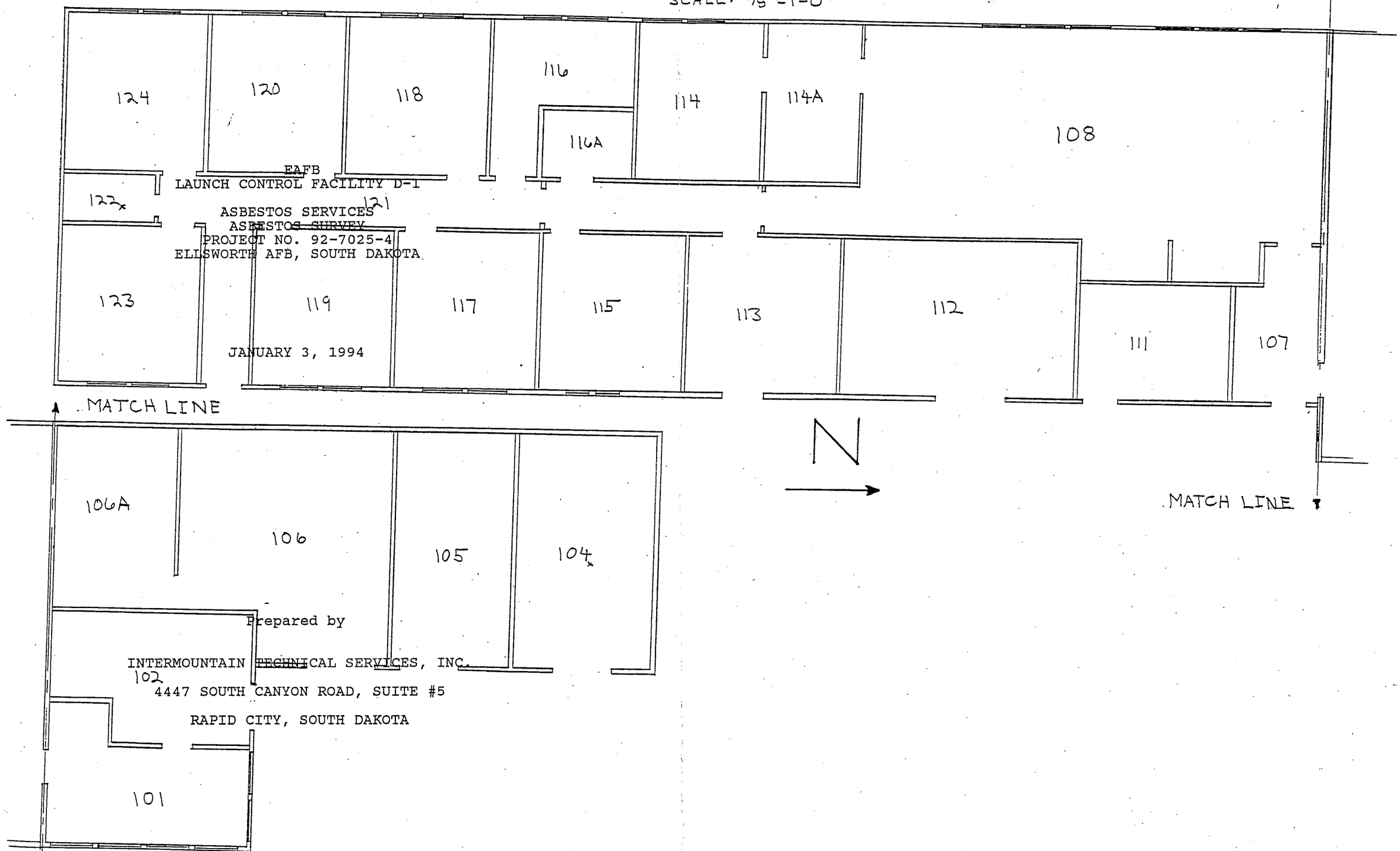
LAUNCH CONTROL FACILITY SITE D-1

SCALE: 1/8"=1'-0"



LAUNCH CONTROL FACILITY SITE D-1

SCALE: 1/8"=1'-0"



EAFB
LAUNCH CONTROL FACILITY D-1

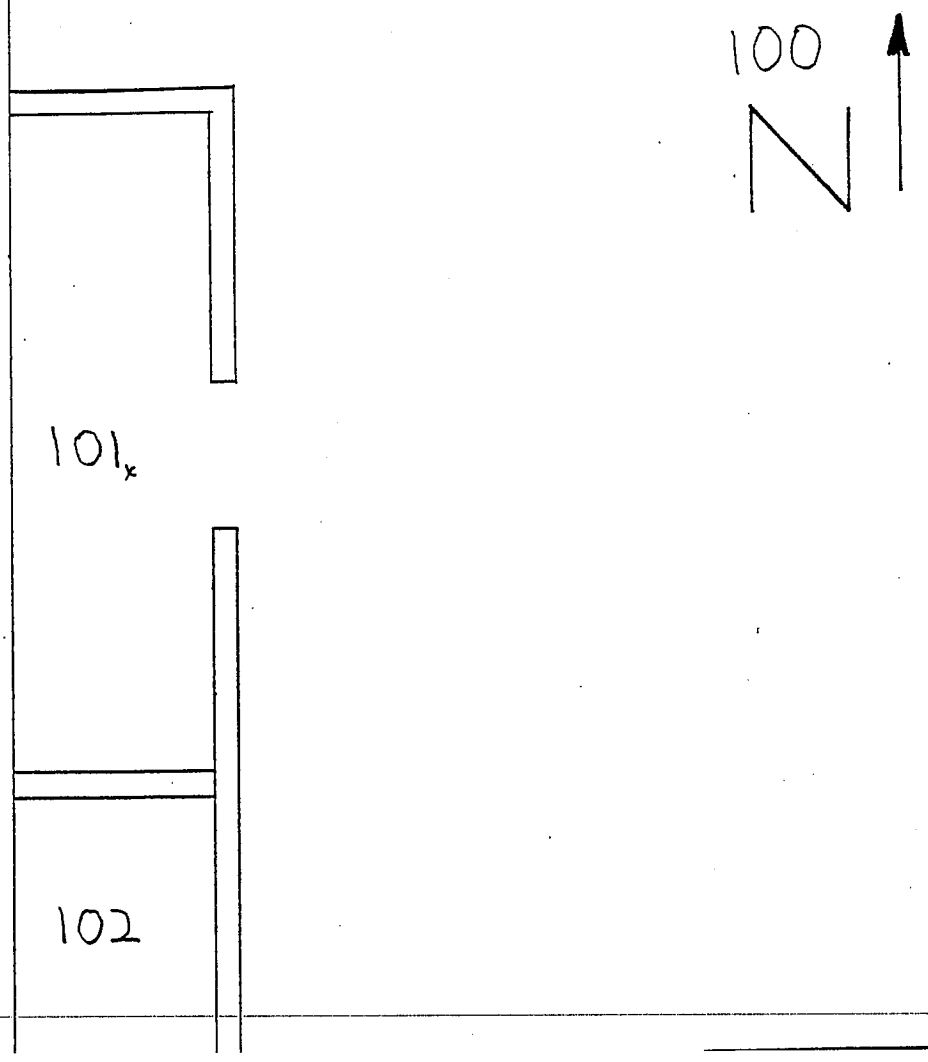
ASBESTOS SERVICES
~~ASBESTOS SURVEY~~
PROJECT NO. 92-7025-4
ELLSWORTH AFB, SOUTH DAKOTA

JANUARY 3, 1994

Prepared by

INTERMOUNTAIN ~~TECHNI~~CAL SERVICES, INC.
4447 SOUTH CANYON ROAD, SUITE #5
RAPID CITY, SOUTH DAKOTA

GARAGE SITE D-1 SCALE: 1/4" = 1'-0"



BUILDING INFORMATION SHEET

PREPARED BY: James Almond

DATE: January 3, 1994

AHERA INSPECTOR: James Almond

AHERA CERTIFICATE:
SD CERTIFICATE: 1471R

BUILDING: Launch Control Facility D-1

BUILDING LOCATION: Wall, South Dakota

DATE OF ORIGINAL CONSTRUCTION: 1962

DATES OF RENOVATIONS: N/A

REVIEW OF EXISTING PLANS: Yes

NUMBER OF FLOORS: One

ESTIMATED FLOOR AREA: 4,935 sq.ft.

ORIGINAL OWNER: United States of America

PRESENT OWNER: United States of America

BUILDING CONSTRUCTION TYPE (STRUCTURE): Wood Frame & Concrete Block

FLOOR CONSTRUCTION MATERIAL: Concrete w/ Floor Tile

CEILING CONSTRUCTION MATERIAL: Sheetrock & Ceiling Tile

WALL CONSTRUCTION MATERIAL: Sheetrock

HVAC SYSTEM DESCRIPTION: Steam from Boiler

THERMAL SYSTEMS INSULATED: Pipe Insulation - Fiberglass
Mudded Pipe Fittings - Wrapped

BUILDING USES: (Approximate Percentages)

USE # 1 Unoccupied 100% OF TOTAL AREA

BUILDING INFORMATION SHEET

PREPARED BY: James Almond DATE: January 3, 1993

AHERA INSPECTOR: James Almond AHERA CERTIFICATE:
SD CERTIFICATE: 1471R

BUILDING: Launch Control Facility D-1 Garage

BUILDING LOCATION: Wall, South Dakota

DATE OF ORIGINAL CONSTRUCTION: 1965

DATES OF RENOVATIONS: N/A

REVIEW OF EXISTING PLANS: Yes

NUMBER OF FLOORS: One

ESTIMATED FLOOR AREA: 1,260 sq.ft.

ORIGINAL OWNER: United States of America

PRESENT OWNER: United States of America

BUILDING CONSTRUCTION TYPE (STRUCTURE): Wood Frame & Concrete Block

FLOOR CONSTRUCTION MATERIAL: Concrete

CEILING CONSTRUCTION MATERIAL: Wood

WALL CONSTRUCTION MATERIAL: Wood

HVAC SYSTEM DESCRIPTION: Heating Unit

THERMAL SYSTEMS INSULATED: N/A

BUILDING USES: (Approximate Percentages)

USE # 1 Unoccupied 100% OF TOTAL AREA

BUILDING INFORMATION SHEET
OPERATIONS BUILDING

AMOUNT OF MATERIAL		MATERIAL TYPE	NUMBER OF SAMPLES
13,966	SF	Sheetrock	7
2,487	SF	Ceiling Tile	5
28	SF	4" Brown Base Cove & Mastic	3
132	SF	4" Black Base Cove & Mastic	3
27	SF	4" Gray Base Cove & Mastic	3
964	SF	Carpet Panel	3
2,312	SF	Floor Tile & Mastic Under Carpet	5
36	SF	12" Brown Linoleum	3
570	SF	12" Brown Floor Tile & Mastic	3
12	SF	Yellow Floor Tile & Mastic (misc.)	3
260	SF	12" Gray Floor Tile & Mastic	3
169	SF	12" Lt. Brown Floor Tile & Mastic	3
202	SF	12" Lt. Gray Floor Tile & Mastic	3
32	SF	9" Tan Floor Tile & Mastic	1
88	EACH	Mudded Pipe Joints	3
3	EACH	Vibration Isolators	3
10	LF	Exhaust Stack Insulation	1
5,110	SF	Shingles Type 1	7
5,110	SF	Shingles Type 2	7
5,110	SF	Roof Felt	7
5	SF	Roof Caulk	3

BUILDING INFORMATION SHEET
GARAGE

AMOUNT OF MATERIAL		MATERIAL TYPE	NUMBER OF SAMPLES
406	SF	Sheetrock	3
10	SF	4" Black Base Cove & Mastic	1
2	EACH	Vibration Isolators	2
1,332	SF	Shingles Type 1	5
1,332	SF	Shingles Type 2	5
1,332	SF	Roof Felt	5
1	SF	Roof Caulk	1

INVENTORY OF HOMOGENEOUS AREAS

FOR BULK SAMPLING RESULTS

	Homogeneous Area	Material	Status	Type
1.	D1-SR-A	Sheetrock	Cleared	M
2.	D1-CT-B	Ceiling Tile 2'x2'	Cleared	M
3.	D1-BC-C	4" Brown Base Cove	Cleared	M
		& Mastic	Cleared	M
4.	D1-BC-D	4" Black Base Cove	Cleared	M
		& Mastic	Cleared	M
5.	D1-BC-E	4" Gray Base Cove	Cleared	M
		& Mastic	Cleared	M
6.	D1-CP-F	Carpet Panel	Cleared	M
7.	D1-FT-G	Floor Tile Under Carpet	10% Chrysotile	M
		& Mastic	Cleared	M
8.	D1-L-H	12" Brown Linoleum	Cleared	M
		& Mastic	Cleared	M
9.	D1-FT-I	12" Brown Floor Tile	Cleared	M
		& Mastic	Cleared	M
10.	D1-FT-J	Yellow (misc.) Floor Tile	Cleared	M
		& Mastic	Cleared	M
11.	D1-FT-K	12" Gray Floor Tile	Cleared	M
		& Mastic	Cleared	M
12.	D1-FT-L	12" Lt. Brown Floor Tile	Cleared	M
		& Mastic	Cleared	M
13.	D1-FT-M	12" Lt. Gray Floor Tile	Cleared	M
		& Mastic	Cleared	M
14.	D1-FT-N	9" Tan Floor Tile	10% Chrysotile	M
		& Mastic	3% Chrysotile	M
15.	D1-TSI-O	Mudded Pipe Joints	3% Chrysotile 2% Amosite	TSI
16.	D1-VI-P	Vibration Isolator	Cleared	M
17.	D1-TSI-Q	Exhaust Stack Insulation	<1% Chrysotile 2% Amosite	TSI
18.	D1-S-R	Shingles Top Layer	Cleared	M
19.	D1-S-S	Shingles Bottom Layer	Cleared	M
20.	D1-RF-T	Roof Felt	Cleared	M
21.	D1-C-U	Roof Caulk	35% Chrysotile	M
22.	D1G-SR-A	Sheetrock	Cleared	M
23.	D1G-BC-B	4" Black Base Cove	Cleared	M
		& Mastic	Cleared	M
24.	D1G-VI-C	Vibration Isolator	50% Chrysotile	M
25.	D1G-S-D	Shingles Top Layer	Cleared	M
26.	D1G-S-E	Shingles Bottom Layer	Cleared	M
27.	D1G-RF-F	Roof Felt	Cleared	M
28.	D1G-C-G	Roof Caulk	25% Chrysotile	M

S = Surfacing Material
TSI = Thermal Systems Insulation
M = Miscellaneous Material

COST ESTIMATE FOR REMOVAL OF ASBESTOS CONTAINING BUILDING MATERIAL (ACBM) FROM LAUNCH CONTROL FACILITY D-1

Functional Space No.	Description of ACBM Identified	Quantity
F-7	Floor Tile Under Carpet & Mastic	2,262 SF
F-14	9" Tan Floor Tile & Mastic	32 SF
F-15	Mudded Pipe Joints	88 EACH
F-17	Exhaust Stack Insulation	10 LF
F-21	Roof Caulk	5 SF
F-24	Vibration Isolator	2 EACH
F-28	Roof Caulk	1 SF

Removal Cost

Functional Space No.	Unit Cost	Total Cost
F-7	4.50	10,179.00
F-14	4.50	144.00
F-15	25.00	2,200.00
F-17	15.00	150.00
F-21	25.00	125.00
F-24	20.00	40.00
F-28	25.00	25.00
	Subtotal	12,863.00
	Other Misc Costs* (Average 40%)	5,145.00
	TOTAL	18,008.00

* The Removal Cost does not include other miscellaneous costs such as abatement design fees, contingencies and construction administration including required industrial hygiene surveillance and air monitoring. To account for these other miscellaneous costs, an additional 40% (average) has been added to subtotal costs for a total project abatement cost.

LAUNCH CONTROL FACILITY D-1
ROOM FINISH SCHEDULE
OPERATIONS BUILDING

ROOM	FLOOR	WALLS	N E S W	CEILING
101	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
102	CONCRETE	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD
104	CARPET & 12" LINOLEUM	GYPSUM BOARD & 4" BROWN BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD
105	12" FLOOR TILE & MASTIC	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD
106	12" FLOOR TILE & MASTIC	GYPSUM BOARD & WOOD BASE COVE	X X X X	GYPSUM BOARD
106A	CONCRETE	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD
107	CARPET OVER FLOOR TILE* (93 SQ. FT.)	GYPSUM BOARD & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
108	CARPET OVER FLOOR TILE* (802 SQ. FT.)	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
111	12" FLOOR TILE & MASTIC	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD
112	12" FLOOR TILE & MASTIC	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD
113	12" FLOOR TILE & MASTIC	GYPSUM BOARD & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD
114	12" FLOOR TILE & MASTIC	GYPSUM BOARD & 4" GRAY BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD
114A	12" FLOOR TILE & MASTIC	GYPSUM BOARD & 4" GRAY BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE

LAUNCH CONTROL FACILITY D-1
ROOM FINISH SCHEDULE
OPERATIONS BUILDING

ROOM	FLOOR	WALLS	N E S W	CEILING
115	QUARRY TILE	GYPSUM BOARD & QUARRY TILE (1/3)	X X X X X X X X	GYPSUM BOARD
116	CARPET OVER FLOOR TILE* (118 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
116A	QUARRY TILE	GYPSUM BOARD & QUARRY TILE (1/2)	X X X X X X X X	GYPSUM BOARD
117	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
118	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
119	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
120	CARPET OVER FLOOR TILE* (155 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
121	CARPET OVER FLOOR TILE* (302 SQ. FT.)	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
122	9" FLOOR TILE* (32 SQ. FT.)	GYPSUM BOARD & 4" BROWN BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD
123	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE
124	CARPET OVER FLOOR TILE* (169 SQ. FT.)	GYPSUM BOARD, CARPET PANEL & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD & 2'X2' CEILING TILE

LAUNCH CONTROL FACILITY D-1
ROOM FINISH SCHEDULE
GARAGE

ROOM	FLOOR	WALLS	N E S W	CEILING
100	CONCRETE	WOOD & WOOD BASE COVE	X X X X X X X X	WOOD
101	CONCRETE	GYPSUM BOARD & 4" BLACK BASE COVE & MASTIC	X X X X X X X X	GYPSUM BOARD
102	CONCRETE	GYPSUM BOARD & WOOD BASE COVE	X X X X X X X X	GYPSUM BOARD

Lexington: NIST (NVLAP) # 1224
Louisville: NIST (NVLAP) # 1224
Lexington/Louisville/Paducah - AIHA PAT # 42431/Member N/

Analytical Management, Inc.
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Telephone 606/299-6556

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Louisville, Ky 502/429-5777
Madisonville, Ky. 502/821-7375
Paducah, Ky. 502/444-6547
Pikeville, Ky. 606/432-3104

ANALYSIS REPORT

IN4447
Intermountain Technical Services
Attn: James Almond
4447 South Canyon Road
Suite 5
Rapid City, South Dakota 57702

Analyzed: 11/08/93

Project Name:
Ellsworth Air Force Base-Launch Control Facilities
Building D1

Lab ID	Project ID	
9311265	D1-SR-A1	**<1% Chrysotile** 25% Cellulose 74% Binder Gray, powdery, fibrous. Sheetrock.
9311266	D1-CT-B1	60% Cellulose 25% Glass 5% Binder 10% Perlite Tan, fibrous, powdery. NO ASBESTOS DETECTED. Ceiling tile 2x2.
9311267	D1-BC-C1	<1% Cellulose 99% Binder Brown vinyl. NO ASBESTOS DETECTED. Brown base cover & mastic, 4".
9311268	D1-BC-D1	1% Cellulose <1% Glass 98% Binder Black vinyl. NO ASBESTOS DETECTED. Black base cove & mastic, 4".
9311269	D1-BC-E1	<1% Cellulose 99% Binder Gray vinyl. NO ASBESTOS DETECTED. Gray base cove & mastic, 4".
9311270	D1-CP-F1	60% Cellulose 20% Glass 5% Binder 15% Perlite Tan fibrous powdery. NO ASBESTOS DETECTED. Carpet Panel.
9311271	D1-FT-G1	**10% Chrysotile** 1% Cellulose 29% Binder 35% Quartz 25% Carbonates Tan, granular, fibrous. Floor tile & mastic under carpet.
9311272	D1-L-H1	3% Cellulose 32% Binder 40% Quartz 25% Carbonates Brown vinyl on granular. NO ASBESTOS DETECTED. Brown linoleum, 12".

Continued on next page.

Submitted by David H. McRae

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Pikeville, Ky. 606/432-3104

ANALYSIS REPORT

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Intermountain Technical Services
Attn: James Almond
4447 South Canyon Road
Suite 5
Rapid City, South Dakota 57702

Analyzed: 11/08/93

Project Name:
Ellsworth Air Force Base-Launch Control Facilities
Building D1

Lab ID	Project ID	
9311273	D1-FT-I1	7% Cellulose 23% Binder 25% Quartz 45% Carbonates Beige, granular fibrous. NO ASBESTOS DETECTED. Brown floor tile & mastic, 12".
9311274	D1-FT-J1	7% Cellulose 21% Binder 25% Quartz 45% Carbonates 2% Mastic Yellow granular fibrous, mastic. NO ASBESTOS DETECTED. Yellow floor tile & mastic.
9311275	D1-FT-R1	5% Cellulose 30% Binder 25% Quartz 40% Carbonates Gray, granular. NO ASBESTOS DETECTED. Gray floor tile & mastic, 12".
9311276	D1-FT-L1	5% Cellulose 30% Binder 20% Quartz 45% Carbonates Beige, granular, fibrous. NO ASBESTOS DETECTED. Light brown floor tile & mastic, 12".
9311277	D1-FT-M1	5% Cellulose 15% Binder 35% Quartz 45% Carbonates Gray, granular, fibrous. NO ASBESTOS DETECTED. Light gray floor tile & mastic, 12".
9311278	D1-FT-N1	10% Chrysotile 33% Binder 20% Quartz 35% Carbonates 2% Mastic Tan, granular fibrous w/mastic. Tan floor tile & mastic, 9". Tile is approx. 10% asbestos, mastic is approx. 3% asbestos.
9311279	D1-TSI-O1	3% Chrysotile 2% Amosite 15% Cellulose 35% Glass 45% Binder Tan, powdery, fibrous. Mudded pipe joints.

Continued on next page.

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Attn: James Almond
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Rapid City, South Dakota 57702

Analyzed: 11/08/93

Project Name:
Ellsworth Air Force Base-Launch Control Facilities
Building D1

Lab ID	Project ID	
9311280	D1-UI-P1	40% Glass 60% Binder White elastic on fibers. NO ASBESTOS DETECTED. Vibration isolators.
9311281	D1-TSI-Q1	<1% Chrysotile 2% Amosite 3% Cellulose 45% Glass 49% Binder Beige, powdery, fibrous. Exhaust stack insulation.
9311282	D1-S-R1	45% Cellulose 40% Binder 10% Quartz 5% Carbonates Black, granular, fibrous. NO ASBESTOS DETECTED. Shingles top layer.
9311283	D1-S-S1	48% Cellulose 37% Binder 10% Quartz 5% Carbonates Black granular fibrous. NO ASBESTOS DETECTED. Shingles bottom layer.
9311284	D1-RF-T1	85% Cellulose 15% Binder Black fibrous layer. NO ASBESTOS DETECTED. Roof felt.
9311285	D1-C-U1	35% Chrysotile 65% Binder Black fibrous tar layer. Roof caulk.

Continued on next page.

Submitted by David H McRae

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ANALYSIS REPORT

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Intermountain Technical Services
Attn: James Almond
4447 South Canyon Road
Suite 5
Rapid City, South Dakota 57702

Analyzed: 11/08/93

Project Name:
Ellsworth Air Force Base-Launch Control Facilities
Building D1G

Lab ID	Project ID	
9311286	D1G-SR-A1	35% Cellulose 65% Binder Gray powdery brown fibrous. NO ASBESTOS DETECTED. Sheetrock.
9311287	D1G-BC-B1	<1% Cellulose 99% Binder Black rubber material. NO ASBESTOS DETECTED. Black base cover & mastic, 4".
9311288	D1G-UI-C1	**50% Chrysotile** 45% Cellulose 5% Binder Gray fibrous rope-type material. Vibration isolator.
9311289	D1G-S-D1	48% Cellulose 32% Binder 15% Quartz 5% Carbonates Brown granular fibrous shingle. NO ASBESTOS DETECTED. Shingle top layer.
9311290	D1G-S-E1	48% Cellulose 32% Binder 15% Quartz 5% Carbonates Black granular fibrous. NO ASBESTOS DETECTED. Shingles bottom layer.
9311291	D1G-RF-F1	85% Cellulose 15% Binder Black fibrous felt tar layer. NO ASBESTOS DETECTED. Roof felt.
9311292	D1G-C-G1	**25% Chrysotile** 75% Binder Black fibrous tar layers. Roof caulk.

Continued on next page.

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National Institute of Standards and Technology

NVLAP

National Voluntary Laboratory Accreditation Pro

SCOPE OF ACCREDITATION

BULK ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 1224 00**

Analytical Management, Inc.
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Lexington, KY 40505
David H. McRae Phone: 606-299-6556

Accreditation Renewal Date: July 1, 1994

NVLAP Code	*Designation*
18/A01	40 Code of Federal Regulations Chapter I (1-1-87 edition) Part 763, Subpart F, Appendix A or the current U. S. Environmental Protection Agency method for the analysis of asbestos in building materials by polarized light microscopy.

DEPARTMENT OF COMMERCE • UNITED STATES OF AMERICA •

For the National Institute of Standards and Technology

United States Department of Commerce
National Institute of Standards and Technology

NVLAP

Certificate of Accreditation

ANALYTICAL MANAGEMENT, INC.
LEXINGTON, KY

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

July 1, 1994
Effective until

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Institute of Standards and Technology

ASBESTOS INSPECTION REPORT

BUILDINGS

DELTA-0I LAUNCH CONTROL FACILITY &

DELTA-09 LAUNCH FACILITY

MINUTEMAN MISSILE NATIONAL HISTORIC SITE

SOUTH DAKOTA

Inspection by:

Anderson Environmental Services

311 W. Custer St, #224

Belle Fourche, SD 57717

605-723-6374

LETTER OF TRANSMITTAL

INSPECTOR'S INFORMATION:

Anderson Environmental Services
Dave Anderson
311 W. Custer St. #224
Belle Fourche, SD 57717

INSPECTION DATES:

7/6/09

OWNER INFORMATION:

Minuteman Missile National Historic Site

South Dakota

SIGNATURE:

BUILDING INFORMATION SHEET

BUILDING NAME:	Delta-0I Launch Control Facility and Delta-09 Launch Facility
BUILDING LOCATION:	
TYPE OF STRUCTURE:	Stick and Masonry Construction
DATE OF ORIG. CONST.:	1962
DATES OF RENOVATIONS:	Various
HVAC DESCRIPTION:	Hot Water Heat
NUMBER OF FLOORS:	2
ESTIMATED FLOOR AREA:	Approximately 2,000 SF
BUILDING OWNER:	US Government, NPS
AHERA INSPECTOR:	Dave Anderson
DESIGNATED PERSON:	John Black
BUILDING USES:	Museum and Tours

TO THE BUILDING OWNER:

This report was prepared by trained and certified asbestos inspectors.

It is the professional opinion of the personnel that prepared the report that it contains only true, accurate, and error free information. However, the building owner should know the limitations of this report. In this regard it should be pointed out that various materials found in certain buildings were not sampled, assessed or in any way addressed as potential sources of asbestos fibers. These areas were left out of this report for two reasons: (1) The need to minimize destructive sampling in school buildings, and (2) the U.S. EPA has published a document that specifically identifies these areas as ones that need not be included in the AHERA inspection report. For the owners information, this document is: "100 COMMONLY ASKED QUESTIONS ABOUT THE NEW AHERA ASBESTOS IN SCHOOLS RULE" published by the Office of Toxic Substances, Office of Pesticides and Toxic Substances. U.S. Environmental Protect ion Agency, Washington, D.C. 20460 dated May 1988.

Specifically these areas are:

1. Cinder block
2. Concrete
3. Blackboards
4. Pressed wood
5. Wall or ceiling carpet
6. Exterior materials of all types
7. Auditorium curtains
8. Table tops and countertops
9. Suspected materials stored in the building
10. Fire proof clothing and blankets
11. Fire bricks and boiler cement

Obviously some of these materials may contain asbestos and could indeed be a real source of health hazard if conditions were such that fibers were released from them. For this reason the building owner is encouraged to be aware of the presence of these materials in all buildings and to take the appropriate action at those times when the potential for fiber release is made present.

PRE INSPECTION INFORMATION

DESCRIPTION OF PREVIOUS ASBESTOS INSPECTION HISTORY:

N/A

DESCRIPTION OF PREVIOUSLY CONFIRMED ASBESTOS CONTAINING BUILDING MATERIALS:

NONE

DESCRIPTION OF PREVIOUSLY COMPLETED SAMPLING FOR ACBM:

NONE

EXCLUSIONARY STATEMENT:

NONE

SUMMARY OF All HOMOGENEOUS AREAS IN THIS BUILDING

BUILDING NAME: Delta-01 Launch Control Facility

BUILDING LOCATION: Minuteman Missile National Historic Site

****

H.A. #	ACBM DESCRIPTION & LOCATION		
1	2x2 Ceiling tile, throughout the building	NA CON	
2	12” floor tile #1, tan with small flecks	NA CON	
3	12” floor tile #2, water room	NA CON	
4	12” floor tile #3, generator room	NA CON	
5	12” floor tile #4, recreation room	NA CON	
6	Mudded pipe joints, throughout	ACM CON	FR, D HPD
7	Sheetrock, throughout	NA CON	
8	shingles	NA CON	
9	Roofing felt	NA	
10	12” floor tile #5, gray	ACM CON	NF, D MPD

NA=non-asbestos
ACBM=asbestos
FR=friable
NF=non-friable
ASS=assumed
CON=confirmed

S=surfacing material
TSI=thermal systems
MISC=miscellaneous
D=damaged
SD=significantly damaged

HPD=high potential for damage
MPD=moderate potential for damage
LPD=low potential for damage

SUMMARY OF All HOMOGENEOUS AREAS IN THIS BUILDING

BUILDING NAME: Delta-01 Launch Control Facility

BUILDING LOCATION: Minuteman Missile National Historic Site

****

H.A. #	ACBM DESCRIPTION & LOCATION		
11	Metalbestos chimney	ACM CON	NF, D MPD
12	Vinyl flooring	NA CON	
13	9” floor tile, West closet	ACM ASS	NF, D MPD
14	Masonite board	NA CON	
15	Flat panels, (transite)	ACM CON	NF, D MPD
16	Furnace plenum	NA CON	
17	LCC vent insulation	ACM CON	NF, D MPD

NA=non-asbestos
ACBM=asbestos
FR=friable
NF=non-friable
ASS=assumed
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S=surfacing material
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MISC=miscellaneous
D=damaged
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HPD=high potential for damage
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SAMPLE LOG

BUILDING NAME AND NUMBER: Delta-01 Launch Control Facility

sample number	sample description/location
NPS-1	2x2 ceiling tile, East side of N-S hall by SCC room
NPS-2	12″ floor tile #1 & mastic, under carpet by door to day room Tan with small flecks
NPS-3	12″ floor tile #2, yellow, in the boiler room
NPS-4	12″ floor tile #3, tan & gray, in the generator room
NPS-5	12″ floor tile #4, wood grain, in the rec. room
NPS-6	12″ Floor tile #5, gray, floor of the LCC
NPS-7	Sheetrock, East side the N-S hall by the SCC room
NPS-8	Sheetrock, mid-South wall of the rec. room
NPS-9	Sheetrock, West wall of the day room, by the kitchen
NPS-10	Sheetrock, in the facility manager’s room

SAMPLE LOG

Building Name & Number: Delta-01 Launch Control Facility

SAMPLE#	SAMPLE DESCRIPTION & LOCATION
NPS-11	Sheetrock, in the SCC room on the East wall
NPS-12	Masonite Board, in the SCC room on the West wall
NPS-13	Asphalt shingle, from the attic space above the boiler room
NPS-14	Roofing felt, from the attic space above the boiler room
NPS-15	Mudded pipe joint, on the West wall of the boiler room
NPS-16	Mudded pipe joint, on the North side of the stack in the boiler room
NPS-17	Mudded pipe joint, on the pipe above the suspended ceiling in the N-S hall
NPS-18	Flat panels, (transite), in the weapons locker in the SCC room
NPS-19	Plenum gasket, on the exhaust plenum for the garage furnace
NPS-20	LCC vent insulation, beige – silver foil covered flex duct on top of the LCC
NPS-21	LCC vent insulation, gray – silver foil covered flex duct on top of the LCC

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 6

DESCRIPTION OF THE H.A.: Mudded Pipe Joints

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

___Undamaged
_X_Damaged
___Significantly damaged

___Non Friable
_X_Friable

_X_TSI
___Miscellaneous

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
___potential is moderate
_X_potential is low

Comments on additional factors that may affect fiber release:

These mudded pipe joints are located throughout the building above the suspended ceiling and in the attic space as well as the boiler room.

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 10

DESCRIPTION OF THE H.A.: 12" Floor tile gray

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

_X _Non Friable
___Friable

___TSI
_X_Miscellaneous

___Undamaged
_X_Damaged
___Significantly damaged

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
_X_potential is moderate
_ __potential is low

Comments on additional factors that may affect fiber release:

This material was found only in the LCC.

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 11

DESCRIPTION OF THE H.A.: Metalbestos chimney

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

_X_Non Friable
___Friable

_X_TSI
___Miscellaneous

___Undamaged
_X_Damaged
___Significantly damaged

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
___potential is moderate
_X_potential is low

Comments on additional factors that may affect fiber release:

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 13

DESCRIPTION OF THE H.A.: 9" floor tile with black mastic

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

_X_Non Friable
___Friable

___TSI
_X_Miscellaneous

___Undamaged
_X_Damaged
___Significantly damaged

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
___potential is moderate
_X_potential is low

Comments on additional factors that may affect fiber release:

This material was only found in the West hall closet. The inspector was told that the entire floor was Covered with 9" tile, but it had been removed and replaced by the previous owner.

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 15

DESCRIPTION OF THE H.A.: Flat Panels - transite

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

_X_Non Friable
___Friable

___Undamaged
_X_Damaged
___Significantly damaged

___TSI
_X_Miscellaneous

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
___potential is moderate
_X_potential is low

Comments on additional factors that may affect fiber release:

In the weapons storage in the SCC room.

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

HOMOGENEOUS AREA ASSESSMENT SUMMARY

BUILDING OWNER: National Park Service

BUILDING NAME: Delta-01 Launch Control Facility

HOMOGENEOUS AREA #: 17

DESCRIPTION OF THE H.A.: LCC vent insulation – gray fiber

The material in this homogeneous area was determined to be:

___Non-Asbestos Containing
_X_Asbestos Containing

_X_Non Friable
___Friable

___Undamaged
_X_Damaged
___Significantly damaged

___TSI
_X_Miscellaneous

___Surfacing

The potential for damage for the material in this H.A. was determined to be:

ACBM with potential for contact with occupants:
___potential is high
_X_potential is moderate
___potential is low

ACBM with potential for influence from vibration:
___potential is high
___potential is moderate
_X_potential is low

ACBM with potential for air erosion:
___potential is high
___potential is moderate
_X_potential is low

Comments on additional factors that may affect fiber release:

INSPECTOR_____Dave Anderson_____

CERTIFICATION__SD #3826_____

SIGNATURE_____DATE_____

Anderson Environmental Services
311 W. Custer St. #224
Belle Fourche, SD 57717
605-723-6374(h)
605-580-6374(c)
tanker1@rushmore.com

December 15, 2009

Mr. John Black
Facility Operations Specialist
Minuteman National Historic Site
21280 Highway 240
Philip, South Dakota 57567

Mr. Black:

The Asbestos Inspection Report provided for the Delta-01 Launch Control Facility and the Delta-09 Launch Facility contains documentation of several areas of asbestos containing materials.

These materials are required to be handled in the following manner:

Mudded Pipe Joints – these joints must be removed by certified asbestos personnel. They are considered regulated asbestos containing materials.

Metalbestos Chimney – the chimneys are considered non-friable and may be removed by maintenance personnel as long as they are not crushed or crumbled and create airborne fibers.

Transite Panels – the panels are considered to be non-friable and may be removed by maintenance personnel if they are misted with water and removed without creating damage or dust.

Floor Tile – the floor tile and black mastic are considered non-friable and as such may be removed by non-certified personnel as long as they are not broken and do not create dust during any disturbance.

LCC Vent Insulation - this material may be removed as non friable material as long as there is no disturbance to the outer cover of the material.

If you have any questions, or if you need more information, please contact me at the numbers listed above.

Sincerely,

Dave Anderson

Dave Anderson









COVER ILLUSTRATIONS

TOP IMAGE: The launch tube of Launch Facility Delta-09 as seen today through the viewing enclosure with a training missile in place. (NPS Photograph)

BOTTOM LEFT: Flight Security Controller's office at Delta-01 Launch Control Facility photographed prior to the shutdown of the site, 1993. (HAER Photograph HAER SD-50-A-46)

BOTTOM MIDDLE: A South Dakota Launch Facility being constructed by contractor, Peter Kiewit and Sons, 1961. (Courtesy of Peter Kiewit and Sons, Inc.)

BOTTOM RIGHT: Test launch of a Minuteman II missile at Vandenberg Air Force Base, California, 1963. ("Site Activation Chronology, Minuteman Project, Ellsworth Air Force Base, South Dakota, July 1963-October 1963," K243.012-40, in USAF Collection, AFHRA)

BACK ILLUSTRATIONS

TOP LEFT: Launch Control Center being constructed by contractor, Peter Kiewit and Sons, 1961. (Courtesy of Peter Kiewit and Sons, Inc.)

TOP RIGHT: Launch Facility Delta-09 with a Peacekeeper security response vehicle inside the compound, 2009. (NPS Photograph)

LEFT SIDE SECOND DOWN: Blast door protecting the Launch Control Center at Delta-01 Launch Control Facility, 1982. (Photograph by Mark Wilderman, MIMI 2363)

LEFT SIDE THIRD DOWN: Launch Control Facility Delta-01, 2007. (John Black, NPS Photograph)

LEFT BOTTOM: Personnel access hatch open at Launch Facility Kilo-09 ca. 1975. (Photograph by Alonzo Hall, MIMI 2941)

RIGHT BOTTOM: Launch Control Facility Delta-01 just after deactivation in 1993 with Interstate 90 in the background. (Photograph by Mathew Loughney)



