

Golf Cart Pathway

Case Study: Enhancing a Community Golf Course in North Carolina with BaseCore HD 3" Geocell

I. Executive Summary

Introduction to the Project

A community golf course located on a picturesque lake with sloping hills in North Carolina faced challenges with maintaining its cart paths and parking areas. To address these issues, the golf course management decided to use BaseCore HD 3" geocell in customized sizes to accommodate the specified 8-foot width. The project involved removing old asphalt areas, recycling the crushed asphalt to level and grade the sub-base, reducing the slope's grade, and incorporating a stone-filled geocell cart path. Additionally, excavated soil was used to create a large, flat, permeable parking lot.



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Purpose of the Case Study

This case study aims to demonstrate the process and benefits of using BaseCore HD 3" geocell for stabilizing cart paths and creating permeable parking areas in a community golf course. The study provides insights into the project's design, implementation, and outcomes, offering valuable information for similar community and recreational projects.

II. Project Background

Site Description

The project site is a community golf course located in North Carolina, characterized by its scenic lake and rolling hills. The existing cart paths and parking areas faced issues such as erosion, unstable surfaces, and maintenance challenges due to the sloping terrain and heavy use.

- **Geographical Location:** North Carolina, USA
- **Environmental Conditions:** Sloping hills, proximity to a lake, and frequent use of paths and parking areas

Project Objectives

The primary objectives of the golf course project were to:

1. **Stabilize Cart Paths:** Provide durable and stable cart paths that can withstand heavy use and prevent erosion.
2. **Create a Permeable Parking Lot:** Develop a large, flat, permeable parking area that manages stormwater effectively and reduces runoff.
3. **Enhance Aesthetic Appeal:** Improve the overall look of the golf course while maintaining its natural beauty and functionality.



III. Challenges and Requirements

Environmental and Structural Challenges

The project faced several challenges due to the site's environmental and structural conditions:

1. **Erosion and Unstable Surfaces:** The sloping terrain led to erosion and unstable surfaces, making it difficult to maintain the cart paths.
2. **Stormwater Management:** The proximity to the lake required effective stormwater management to prevent runoff and protect the water quality.
3. **Heavy Use:** The cart paths and parking areas experienced heavy use, necessitating a durable and low-maintenance solution.

Project Requirements

To address these challenges, the project had specific requirements:

1. **Effective Soil Stabilization:** A solution that could stabilize the loose soils and prevent erosion.
2. **Permeable Surface:** A permeable surface for the parking lot to manage stormwater and reduce runoff.
3. **Customization:** Customized geocell sizes to accommodate the specific width of the cart paths.
4. **Cost-Effectiveness:** An economical solution, considering both installation and long-term maintenance costs.

IV. Solution: BaseCore HD 3" Geocell

Introduction to BaseCore HD 3" Geocell

BaseCore HD 3" geocell is an advanced geotechnical product designed to stabilize soils and improve load-bearing capacity. The geocell forms a honeycomb-like structure that confines soil and aggregate, distributing loads evenly and preventing erosion.

- **Description and Technical Specifications:**
 - Material: High-density polyethylene (HDPE)
 - Cell Height: 3 inches
 - Structure: Honeycomb-like cells that interlock to form a stable matrix
 - Key Properties: High tensile strength, resistance to environmental degradation, flexibility
- **Benefits and Applications:**
 - Provides superior load distribution and soil confinement
 - Reduces soil erosion and maintains structural integrity
 - Suitable for various applications, including cart paths, access roads, and parking areas

Selection Rationale

BaseCore HD 3" geocell was chosen for this golf course project due to its ability to address the specific challenges of the site:

1. **Enhanced Stability:** The geocell's structure provided effective soil stabilization, preventing erosion and creating stable surfaces.
2. **Customizable Sizes:** Customized geocell sizes were provided to meet the specific width requirements of the cart paths.
3. **Durability and Low Maintenance:** The high-density polyethylene material ensured long-lasting performance with minimal maintenance requirements.
4. **Permeable Solution:** The geocell system allowed for the creation of a permeable parking lot, improving stormwater management.

V. Project Implementation

Design and Planning

The design and planning phase involved assessing the site conditions and developing a detailed plan for the geocell installation:

1. **Site Assessment:** A thorough site assessment was conducted to understand the soil conditions, slopes, and drainage patterns.

2. **Cart Path and Parking Lot Design:** The design incorporated BaseCore HD 3" geocell for cart paths and parking areas, ensuring optimal soil stabilization and load distribution.

Installation Process

The installation of BaseCore HD 3" geocell involved several key steps:

1. **Step-by-Step Installation Procedure:**
 - **Site Preparation:** The old asphalt areas were removed, and the crushed asphalt was recycled to level and grade the sub-base.
 - **Geocell Deployment:** Customized BaseCore HD 3" geocells were laid out over the prepared surface, expanded to their full dimensions, and secured in place.
 - **Filling and Compaction:** The geocells were filled with stone and compacted to create a stable cart path. The soil was moved to create a large, flat, permeable parking lot.
 - **Retaining Wall Construction:** A block retaining wall was built by stacking BaseCore geocells, reducing the slope's grade and providing additional stability.
 - **Surface Finishing:** A final layer of aggregate material was applied and compacted, providing a smooth and durable surface for the cart path and parking lot.
2. **Equipment and Materials Used:**
 - Skid steer for site preparation and material handling
 - Compactors for filling and compacting the geocell structures
 - High-quality aggregate material for filling and surface finishing
3. **Timeline and Milestones:**
 - The installation process was divided into key phases, each with specific milestones and completion dates.
 - Regular progress reviews ensured that the project stayed on schedule and any issues were promptly addressed.

VI. Results and Outcomes

Performance Metrics

The performance of the BaseCore HD 3" geocell solution was evaluated based on several key metrics:

1. **Stability and Load-Bearing Capacity Improvements:**
 - Post-installation assessments showed significant improvements in soil stability and load-bearing capacity, ensuring the cart paths could withstand heavy use and environmental conditions.
2. **Environmental Impact Assessment:**
 - The use of BaseCore HD 3" geocell minimized soil erosion and maintained the structural integrity of the cart paths and parking lot, fulfilling the project's environmental objectives.

Comparative Analysis

To gauge the effectiveness of BaseCore HD 3" geocell, a comparative analysis was conducted:

1. Pre-Installation vs. Post-Installation Conditions:

- Before installation, the cart paths and parking areas were prone to erosion and instability, making them difficult to maintain and navigate.
- After installation, the paths and parking lot exhibited enhanced stability and durability, with the geocell system effectively distributing loads and preventing erosion.

2. Comparison with Traditional Methods:

- Traditional construction methods would have required extensive soil replacement and deep foundations, resulting in higher costs and greater environmental impact.
- The BaseCore HD 3" geocell solution proved to be more cost-effective, quicker to install, and environmentally friendly, highlighting its advantages over conventional approaches.

Long-Term Sustainability

The long-term sustainability of the cart paths and parking lot was a critical measure of the project's success:

1. Maintenance Requirements and Longevity:

- The geocell system required minimal maintenance, reducing long-term costs and resource requirements.
- Projections indicated that the cart paths and parking lot would maintain their structural integrity and performance for many years, providing a durable and reliable infrastructure solution.

2. Observations Over a Specified Period:

- Regular monitoring and inspections over a specified period confirmed the ongoing effectiveness of the BaseCore HD 3" geocell system.
- Data collected from these observations demonstrated the system's ability to withstand environmental challenges and heavy use without significant degradation.

VII. Environmental and Economic Impact

Environmental Benefits

The use of BaseCore HD 3" geocell in the golf course project yielded several significant environmental benefits:

1. Reduced Soil Erosion and Habitat Disruption:

- The geocell system effectively confined and stabilized the soil, preventing erosion that could damage the surrounding environment.
- By minimizing soil movement, the project protected the local ecosystem and vegetation.

2. Improved Stormwater Management:

- The permeable parking lot design allowed for effective stormwater management, reducing runoff and protecting the nearby lake's water quality.

Economic Analysis

The economic impact of the project was analyzed to assess cost-effectiveness and return on investment:

1. Cost Savings in Construction and Maintenance:

- The use of BaseCore HD 3" geocell resulted in significant cost savings compared to traditional construction methods that would have required extensive soil replacement and deep foundations.
- The geocell system's durability and minimal maintenance requirements further contributed to long-term cost savings.

2. Return on Investment (ROI) Analysis:

- An ROI analysis demonstrated that the initial investment in BaseCore HD 3" geocell was quickly offset by the reduced construction and maintenance costs.
- The enhanced stability and longevity of the cart paths and parking lot ensured a high return on investment, providing economic benefits to the golf course community.

VIII. Stakeholder Feedback

Testimonials from Golf Course Management

Feedback from the golf course management highlighted the effectiveness and advantages of using BaseCore HD 3" geocell:

1. Insights from Management and Maintenance Staff:

- The management praised the geocell system for its ease of installation and significant improvements in soil stability and load-bearing capacity.
- Maintenance staff appreciated the minimal upkeep requirements and long-term durability of the cart paths and parking lot.

Community and Regulatory Feedback

The response from the local community and regulatory bodies was overwhelmingly positive:

1. Local Community Response and Approval:

- Community members expressed satisfaction with the improved cart paths and parking lot, noting enhanced usability and aesthetic appeal.
- The project's commitment to environmental preservation garnered widespread support and approval from residents and local organizations.

2. Compliance with Local Regulations:

- The project adhered to all local regulations and standards, demonstrating a responsible and sustainable approach to recreational construction.

IX. Lessons Learned and Best Practices

Key Takeaways

The golf course project provided several valuable insights and lessons learned:

1. Success Factors and Critical Decisions:

- The decision to use BaseCore HD 3" geocell was pivotal in overcoming the challenges posed by the sloping terrain and heavy use. The geocell's ability to stabilize soil and distribute loads effectively was crucial to the project's success.
- The inclusion of a block retaining wall and permeable parking lot demonstrated the importance of incorporating complementary solutions for added stability and functionality.

2. Challenges Faced and How They Were Overcome:

- Initial site conditions, such as erosion and unstable surfaces, were significant obstacles. These were addressed through thorough site assessments and the strategic use of geocell and geotextile technologies.
- Effective planning and collaboration among stakeholders ensured the project met all objectives and regulatory requirements.

Recommendations for Future Projects

Based on the experience gained from this project, several best practices can be recommended for similar community and recreational initiatives:

1. Guidelines for Similar Projects in Challenging Terrain:

- Conduct comprehensive site assessments to understand the unique environmental and structural challenges of the project area.
- Choose geotechnical solutions, like BaseCore HD 3" geocell, that offer both stability and environmental compatibility.
- Incorporate complementary materials and designs, such as retaining walls and permeable surfaces, to enhance the overall effectiveness and durability of the construction.

2. Community Involvement and Education:

- Engage the community in the planning process to ensure their needs and concerns are addressed.
- Provide clear information and education on the benefits and proper maintenance of geocell systems to encourage community support and involvement.

X. Conclusion

Summary of Achievements

The golf course project successfully achieved its primary objectives of stabilizing cart paths, creating a permeable parking lot, and enhancing the aesthetic appeal of the facility. The strategic use of BaseCore HD 3" geocell played a crucial role in overcoming the challenges posed by the sloping terrain and heavy use.

- **Cart Path Stability and Durability:** The geocell system provided exceptional soil stabilization and load distribution, ensuring stable and long-lasting cart paths.
- **Permeable Parking Lot:** The permeable parking lot design improved stormwater management and reduced runoff, protecting the nearby lake's water quality.
- **Cost-Effectiveness and Efficiency:** The innovative approach resulted in significant cost savings in both construction and long-term maintenance, providing a high return on investment.

Future Outlook

The success of this project highlights the potential for using BaseCore HD 3" geocell in similar community and recreational applications, particularly in challenging environments. The lessons learned and best practices established here can serve as a model for future projects, promoting sustainable and resilient infrastructure development.

XI. Appendices

Technical Data Sheets

- **BaseCore HD 3" Geocell Specifications:**
 - Material: High-density polyethylene (HDPE)
 - Cell dimensions, tensile strength, and environmental resistance properties

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