APPENDIX C

CONSTRUCTION DOCUMENTATION REPORTS

2005 through 2009.
Executive Summaries; appendices not included.

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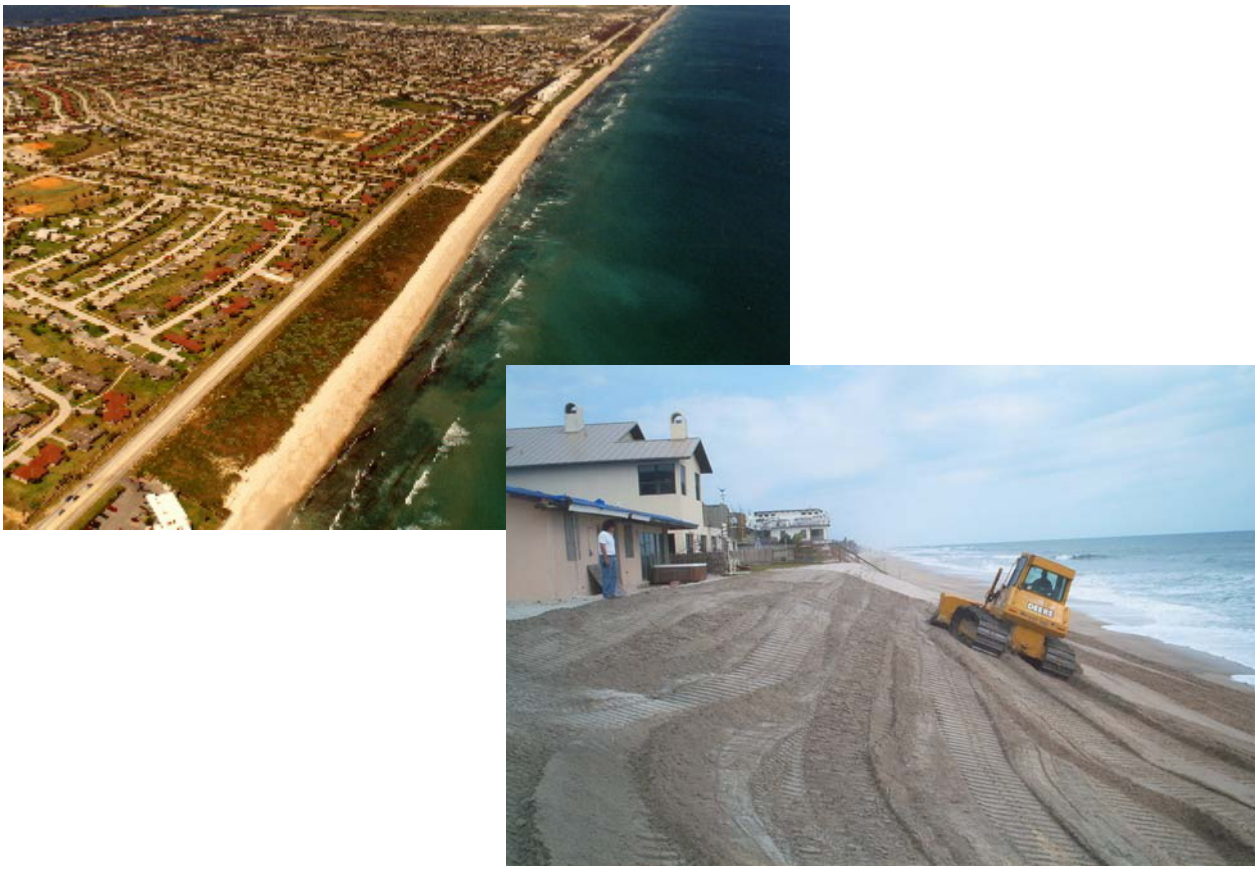

CONSTRUCTION SUMMARY REPORT

EMERGENCY SAND BERM CONSTRUCTION
PHASE I AND II
BREVARD COUNTY, FLORIDA

Presented by:

AMEC Earth and Environmental, Inc.
3815 North US 1, Suite 103
Cocoa, Florida 32926
(321) 433-0223

May 2, 2005

May 2, 2005

Mr. Mike McGarry
Brevard County
Natural Resources Management Office
2725 Judge Fran Jamieson Way - Bldg. A
Viera, Florida 32940

RE: Construction Summary Report
Emergency Sand Berm Construction Phase I & II
Brevard County, Florida
AMEC Project Numbers:
3-524-00000 (Phase I) and 5-436-9000 (Phase II)

Dear Mr. McGarry:

In December 2004, AMEC was contracted to perform construction monitoring and technical support for the referenced project. The project involved three contractors rebuilding Brevard County's dunes and beaches. The first phase of the project included only FEMA funded properties with structures in danger of further damage from erosion of the dune. The second phase of the project included rebuilding dunes and beaches for extended reaches of Brevard County's shoreline.

This report contains a construction summary that includes a brief site description, project costs, and general notes related to the project. Appendix I contains a detailed table presenting FEMA and non-FEMA sand quantities by location for each contractor. Appendix II contains copies of laboratory testing results performed for the project. Appendix III contains costs and quantities associated with extra work performed by each contractor for the project. Appendix IV contains selected project photographs. The attached compact disks contain project data files and digital photographs for each of the contractor's work areas.

We appreciate this opportunity to be of service and look forward to continuing our relationship with Brevard County. If you have questions regarding this Construction Summary Report, please contact us at your convenience.

Sincerely,
AMEC Earth & Environmental, Inc.

John H. Wonderly Jr.
Field Manager

Edward Newman
Project Manager

Cc: Virginia Barker (Brevard County)
Kevin Bodge (Olsen and Associates)

Attachments

CONSTRUCTION SUMMARY
Emergency Sand Berm Construction Phase I & II
Brevard County, Florida

Project Description:

The project site is located along the coastline of the Atlantic Ocean within Brevard County, Florida. The total project length is approximately 17.2 miles and stretches from the south end of Patrick Air Force Base to north of Sebastian Beach Inlet. The project involved removal of debris; transporting beach quality sand from inland sources; and placing beach quality sand in order to partially rebuild dunes and beaches eroded by multiple hurricanes that occurred in 2004.

Three contractors placed over one-half million cubic yards of sand from January 3, 2005 to April 22, 2005. The beach quality sand was transported by tandem axle haul trucks from inland sources to staging areas and then distributed to the proper locations on the beach with off-road dump trucks. Subsequently, the sand was placed into template with bulldozers and tilled due to environmental concerns for nesting turtles.

Contractors:

Phillips and Jordan, Inc. (P&J)
4589-B Oleander Drive
Myrtle Beach, SC 29577

J. P. Donovan Construction, Inc. (Donovan)
P. O. Box 5666
Titusville, FL 32783

RKT Constructors, Inc. (RKT)
5220 S. Washington Avenue
Titusville, FL 32780

Construction Dates:

P&J – From February 7, 2005 to March 16, 2005

Donovan – From February 5, 2005 to April 14, 2005

RTK – From January 3, 2005 to April 25, 2005

CONSTRUCTION SUMMARY
Emergency Sand Berm Construction Phase I & II
Brevard County, Florida

Project Costs:

ESTIMATED SAND QUANTITY AND PERCENTAGES BY CONTRACTOR

CONTRACTOR	FEMA SAND (CY)	%	NON-FEMA (CY)	%
P & J	38 K	30	89 K	70
Donovan	46 K	17	219 K	83
RKT	47 K	27	126 K	73

ESTIMATED COSTS BY CONTRACTOR AND AMEC COSTS
(BASED ON SAND QUANTITY AND PERCENTAGES)

CONTRACTOR	TOTAL ESTIMATED COSTS BY CONTRACTOR	ESTIMATED COSTS BY CONTRACTOR FOR:		ESTIMATED COSTS FOR AMEC SERVICES	
		FEMA SAND	NON-FEMA SAND	FEMA WORK	NON-FEMA WORK
P & J	$4.0 M	$1.2 M	$2.8 M	$66 K	$147 K
Donovan	$7.9 M	$1.4 M	$6.5 M	$36 K	$184 K
RKT	$4.1 M	$1.1 M	$2.9 M	$153 K	$153 K

CONSTRUCTION SUMMARY
Emergency Sand Berm Construction Phase I & II
Brevard County, Florida

Project Notes:

All phases of the emergency sand berm project were successfully completed and were constructed per contract specifications. The first phase of the project included FEMA approved properties at six cubic yards per linear foot of dune constructed by RKT Constructors. During the course of Phase I, additional funds were acquired to place sand at non-FEMA approved properties. Phase II required two additional contractors (P&J and Donovan). The FEMA sand placement locations from Phase I were incorporated into Phase II and redistributed between the three contractors by sections to provide continuous work areas for each contractor.

The overall dune geometry was modified from the original specifications due to storms, high tides and existing eroded embankment heights. Initially, the specifications depicted an outslope of the dune at a ratio of 3 horizontal to 1 vertical. The dune outslope ratio was changed as steep as 1 horizontal to 1 vertical to reduce erosion from the ocean, create a distinct break-angle between the dune and beach, and virtually eliminate drop offs from the existing embankments.

Near the end of Phase II, mid-reach sand was added primarily at the northern portion of the project at selected locations at variable rates (cubic yards per foot of beach). The mid-reach sand was placed at a less steep angle from the toe of the slope of the dune towards the ocean near the inland side of the high-water line to re-nourish the existing beach and protect the newly placed dune. A portion of the mid-reach sand was washed away during high tides and appeared to prevent some erosion of the dunes.

Sand quantities were tracked by AMEC for each of the three contractors by counting each truckload of sand delivered from the road to each staging area and by counting each load of sand placed on the beach. All haul truck and off road dump truck volumes were measured in the field and a “percent full” was estimated per load to determine a volume of sand for each truckload. Due to slight rounding errors in estimating “percent full” for each truck and volume calculations, relatively small errors existed between the quantity of sand delivered and the quantity of sand placed.

During the project, some property owners voiced complaints to the County regarding a perceived deficiency in the quantity of sand placed by the contractors and the amount of sand that existed before the hurricanes. In response, Brevard County had the geometry of the sand berm measured and then reviewed before and after photographs for each property in question. For nearly every property reviewed, it was determined that the approved amount of sand had been placed. The intention of the project only allowed sand placement of 5 to 6 cubic yards per linear foot of dune and did not allow the rebuilding of the dunes to pre-hurricane configuration.

Several project locations contained excessive debris that appeared to be outside the scope of work of the project. At these “large debris” sites, contractors removed the debris on a time and material basis after Brevard County approved estimates. The debris primarily contained concrete rubble with rebar and it was disposed of properly.

On March 1, 2005, visual inspections started for turtle nests. All contractors were required to delay work until nests were marked and the "all clear" was given to continue work on the beach with heavy equipment. All three contractors were able to avoid negative impact to turtles and their nests during the project.

In an attempt for cost savings, an alternate sand source was identified by Brevard County near Mims, Florida. The sand source was created from previous dredging operations of a nearby river and Brevard County was granted permission to use the sand at no cost for material. The sand was tested for calcium carbonate content and grain size and it was found to be within specifications. After using the sand source for a few days, the roads along the haul route exhibited rutting and complaints were reported from the local residents. Due to local resident concerns and damage to the road, the use of the Mims sand source was discontinued and repairs to the roads along haul route were performed during demobilization.

Overall, the project was completed ahead of schedule and was successful in aiding the restoration of Brevard County's coastline.

PROJECT SUMMARY REPORT

ENGINEERED BERM RECONSTRUCTION 2006
BREVARD COUNTY, FLORIDA

Prepared by:

AMEC Earth & Environmental, Inc.
3815 North US 1, Suite 103
Cocoa, Florida 32926
(321) 433-0223

amec

October 23, 2006

Mr. Mike McGarry
Brevard County
Natural Resources Management Office
2725 Judge Fran Jamieson Way – Building A
Viera, Florida 32940

RE: Project Summary Report
Brevard County Engineered Berm Reconstruction
AMEC Project Number 5-4750-0000

Dear Mr. McGarry:

In February 2006, AMEC was contracted to perform construction management services for the referenced project. The project involved the supervision and quantitative verification of the construction contractor performing truck haul and earth moving operations repairing erosive storm damage to portions of Brevard County's shoreline, caused by the 2005 hurricane season.

This report includes a brief site description and summary of project tasks, along with appendices of project documentation. Specifically, Appendix 1 presents volumes of sand placed by Waypoint. Appendix 2 presents sign-off documentation for restored areas. Appendix 3 presents selected project photographs for each work site and the project photo log. Appendix 4 contains the daily truck reports prepared by AMEC, truck measurements and the truck weight volume tickets. Original hard copy truck weight volume tickets from the subcontractor are included under separate cover. Appendix 5 presents the digital maps with staging site indicators. Additionally, compact disks containing digital data files and project photographs are attached.

If you have questions regarding this Project Summary Report, please do not hesitate to contact us. We appreciate this opportunity to be of service, and look forward to continuing our relationship with Brevard County.

Sincerely,

AMEC Earth & Environmental, Inc.

Edward R. Newman

Edward Newman
Project Manager

Attachments

AMEC Earth & Environmental, Inc.
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Cocoa, FL 32926
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Fax (321) 433-0213
www.amec.com

PROJECT SUMMARY
ENGINEERED BERM RECONSTRUCTION 2006
BREVARD COUNTY, FL

1.0 INTRODUCTION

The project site encompassed the Atlantic Ocean coastline within Brevard County, Florida extending approximately 22 miles from the south end of Patrick Air Force Base to north of Sebastian Inlet. The two construction regions, the Mid Reach (FDEP R Monument 75.4 to 118.3) and the South Beaches (FDEP R139 to R213), were north and south of the US Army Corps of Engineer's South Reach Federal Shore Protection Project. The project involved transporting approved sand from an inland borrow source (Central Sand in Titusville, FL) and placing the same in a permitted profile to repair erosion documented after Hurricane Wilma during the 2005 hurricane season. The project included repairing emergency berm damage on FEMA approved Category B properties at up to six cubic yards per linear foot of berm.

2.0 PROJECT SUMMARY

2.1 Planning and Management

In February 2006, AMEC was contracted to perform construction monitoring and inspection services for the referenced project. The project involved supervising one construction contractor performing truck haul and earth moving operations to repair erosive storm damage to portions of Brevard County's shoreline.

AMEC supervised the construction contractor's operations and provided the County with daily reports of sand volumes hauled to the staging sites and sand placed in profile. AMEC visually inspected each load of material to verify sand quality, and provided verbal reports to the County. Daily reports were submitted in the format shown in Appendix 1 (Summary of Way Point Volumes). AMEC also reviewed the construction contractor's submittals, delivery tickets, and invoices; and provided general liaison with the County. As construction proceeded, AMEC verified contractor area completions and then documented County acceptance on Area Completion Sign Off Sheets (Appendix 2).

2.2 Construction Observation and Documentation

The construction contractor, J. P. Donovan, placed 174,623 cy (cubic yards) of sand in profile* from February 27 to April 26, 2006. Sand was transported by tandem axle haul trucks from inland borrow sources to staging areas, and then distributed on the beach with off-road dump trucks. Volumes eligible for payment were determined by volumes measured in highway transport trucks, while volume placed on the beach were measured by the volumes of off road dump trucks. The sand was placed into profile with bulldozers and subsequently tilled with a tractor. Photo documentation is presented in Appendix 3.

AMEC tracked sand quantities by counting each truckload delivered from the borrow source to each staging site, and each load placed on the beach. All truck beds were measured in the field to calculate their volume. As the sand was delivered, a "percent full" was estimated for each load. This percentage was then multiplied by the truck's volume, and the resulting number was recorded as the volume delivered. Truck reports, truck dimensions and the original truck weight tickets for the project are included in Appendix 4. Prior to the beginning of the project, Brevard

*Pay volume. Total placed volume was 175,354 cy per Table 1. (ref-Amec 11/15/06)

County provided AMEC with a list of Waypoints (reference Appendix 1 – Summary of Way Point Volumes) along with aerial photo maps, which identified each Waypoint, the volume to be placed at each Waypoint and staging site indicators (reference Appendix V). AMEC then staked each Waypoint segment. The placed volumes were measured between each pair of Waypoints to match loss volumes provided by the County.

Prior to beginning construction, the overall dune geometry (permitted profile) was modified from the original specifications. The original permit specified a dune outslope of 1 horizontal to 1 vertical. A permit modification changed the slope design ratio to include a 1.5 horizontal to 1 vertical slope on the western dune, with a 4:1 (H:V) slope stretching roughly 20-30 feet seaward from the toe of the 1.5:1 slope in order to reduce the likelihood of scarping at the dune base.

As part of the environmental site preparation process, debris (primarily concrete rubble with rebar and wooden debris), from several locations was removed via dumpster by the construction contractor in compliance with the environmental permit. The dumpster volume was calculated on a cubic yard basis, so that debris quantity could be documented. The interior measurements of the subcontractor's dumpster were 16.5' x 7.0' x 3.8', which yields a volume of 16.3 cubic yards. The dumpster fill was confirmed 100% capacity and verified that the contents did not contain any household or other trash. Where material was large enough to require transport by truck, the same measuring method to document sand haul volume was utilized (bed size 16.17' x 7.33' x 5.17' = 22.7 cy total capacity). AMEC verified that JP Donovan Truck #14 hauled 13.6 cy (60% full) on April 13, 2006. Total environmental site prep debris volume was 29.9 cy.

Also, in accordance with the permit, early morning turtle surveys commenced on March 1, 2006. Turtle monitoring was performed by researchers from the University of Central Florida under contract with Brevard County. After this date, work began after the "all clear" was given for accessing the beach with heavy equipment. No nests were relocated during the project.

Compaction of the constructed beach and dune areas was tested in accordance with the environmental permit by the same personnel from the University of Central Florida who monitored the sea turtle nesting. The compaction test results determined that tilling would be required along isolated sections of the south beaches from R-139 to R-213 and throughout the entire mid reach area from R75.4 to R118.3. Tilling loosened the beach/dune material to provide compatible conditions for turtle nesting.

Project tilling was performed by Tigerhole Landscaping, Inc. under subcontract with J.P. Donovan. The south beaches area was tilled between March 17th , 2006 and March 19th , 2006, and the Mid Reach was tilled between April 26th and April 30th. AMEC monitored the tilling task and verified that the contractor maintained a tilled depth of 36 inches and met all other specification requirements.

2.3 Final Report Preparation and Project Closeout

The 2005-2006 Emergency Sand Berm Reconstruction Project was constructed to contract specifications. Final results are summarized below in Table 1.

Table 1 – Project Summary

Mid Reach (FDEP R75.4 to R118.3)				
Total Sand Placed (CY)	**FEMA Category B (CY)**	**Percent**	**FEMA Category G (CY)**	**Percent**
127,584.0	**5,385.0**	**4%**	**122,199.0**	**96%**
South Beaches (FDEP R139 to R213)				
Total Sand Placed (CY)	**FEMA Category B (CY)**	**Percent**	**FEMA Category G (CY)**	**Percent**
47,770.0	**11,954.0**	**25%**	**35,816.0**	**75%**
Project Totals				
Total Sand Placed (CY)	**FEMA Category B (CY)**	**Percent**	**FEMA Category G (CY)**	**Percent**
175,354.0	**17,339.0**	**10%**	**158,015.0**	**90%**

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2008 Brevard County Construction of Emergency Sand Berms

CONSTRUCTION SUMMARY REPORT

Submitted by:

AMEC Earth & Environmental, Inc.
3815 North US 1, Suite 103
Cocoa, Florida 32926

July 2008

1 July 2008

Mr. Mike McGarry
Brevard County
Natural Resources Management Office
2725 Judge Fran Jamieson Way – Building A
Viera, Florida 32940

Re: Project Summary Report
Construction of Emergency Sand Berms 2008
Brevard County, FL
AMEC Project Number 5-5204-0000

AMEC Earth & Environmental, Inc. (AMEC) is pleased to submit this Summary Report for the 2008 Brevard County Construction of Emergency Sand Berms project. This report includes a brief project description and task summary, along with appendices of project documentation.

Specifically, Appendix I presents sand volumes placed by Waypoint. Appendix II presents sign-off documentation for the restored areas. Appendix III presents representative photographs and the project photo log. Appendix IV presents the daily sand volumes delivered by each truck to the stockpile sites (truck reports) and the truck bed measurements. Appendix V presents results of the sand quality testing specified by Brevard County. Appendix VI presents the digital maps with staging sites indicated. Appendix VII presents the excavation time and debris volumes in the vicinity of 4525, A1A. Appendix VIII presents monthly engineering status reports completed for the Florida Department of Environmental Protection (FDEP) as required by the permit and provided to the County for submittal to FDEP. Compact disks containing digital data files and project photographs are also included.

If you have questions, please do not hesitate to contact me. AMEC appreciates this opportunity to be of continuing service to Brevard County.

Very Respectfully,
AMEC Earth & Environmental, Inc.

Galand Beard

Galand Beard

Appendices

AMEC Earth & Environmental, Inc.
3815 North US 1, Suite 103
Cocoa, Florida 32926
Tel 1+(321) 433-0223
Fax 1+(321) 433-0213
www.amec.com

CONSTRUCTION SUMMARY
BERM RECONSTRUCTION 2008
BREVARD COUNTY, FL

1.0 INTRODUCTION

The project site is along the Atlantic Ocean coastline within Brevard County, Florida; and extends for approximately 20 miles from the south end of Patrick Air Force Base to north of Sebastian Inlet. The two construction regions, R75.3 to R118.3 and R139 to R213, were north and south, respectively, of the South Reach Federal Shore Protection Project. The project involved transporting beach quality sand from inland borrow sources and placing the sand in a permitted profile to repair erosion damage to the engineered beach/dune. The project included repairing dune damage at less than ten cubic yards per linear foot of shoreline.

2.0 PROJECT SUMMARY

2.1 Planning and Management

In February 2008, AMEC was contracted to perform construction management and engineering services for the referenced project. The project involved supervising one construction contractor performing truck haul and earth moving operations to repair erosive storm damage to portions of Brevard County's shoreline.

AMEC supervised the construction contractor's operations and provided the County with daily reports of sand volumes hauled to the stockpile staging sites and sand placed in profile. AMEC visually inspected each load of material for sand quality and provided daily verbal reports to the County. Reports were submitted in the format shown in Appendix I (Summary of Way Point Volumes). AMEC also reviewed the construction contractor's delivery tickets, and provided liaison with the County. AMEC concurrently coordinated for County approval as construction proceeded, and documented County acceptance on Area Completion Sign Off Sheets (Appendix II).

2.2 Construction Observation and Documentation

The construction contractor, CKA, LLC placed over 126,000 cubic yards of sand in profile from February 19 to April 19, 2008. Sand was transported by tandem axle haul trucks and semi's from inland borrow sources to stockpile staging areas, and then distributed on the beach with off-road dump trucks. The sand was placed into profile with a bulldozer. Representative photo documentation and the final photo log are presented in Appendix III.

AMEC tracked sand quantities by counting each truckload delivered from the borrow source to each stockpile staging site, and each load placed on the beach. All truck beds were measured in the field to verify their volumetric capacity. As the sand was delivered, the load was verified from an elevated platform and a "percent full" was estimated for each load. This percentage was then multiplied by the truck's volumetric capacity, and the resulting number was recorded as the volume delivered. Truck reports are included in Appendix IV. Due to different interpretations in estimating "percent full" for each truck, relatively small (<.001%) differences existed between the quantity of sand delivered to the stockpile staging sites and the quantity of sand placed into profile. Before beginning the project, Brevard County provided AMEC with a list of waypoints (Appendix I – Summary of Way Point Volumes) along with aerial photo maps which identified each way point (Appendix VI). Prior to sand placement, AMEC staked each way point segment. The placement volumes were measured between each pair of way points to match loss volumes provided by the County.

There was debris in the vicinity of 4525, A1A, which was removed by the construction contractor as required by permit prior to sand placement in this area. The debris consisted primarily of concrete rubble with rebar. AMEC documented equipment time necessary to excavate deeply buried debris at this site. Excavation time and debris volumes are recorded in Appendix VII. Debris volume was determined by the same method used to determine sand volume, and was paid on a cubic yard basis.

In accordance with the permit, early morning turtle surveys commenced on March 1, 2008. Turtle monitoring was accomplished by researchers from the University of Central Florida under the guidance of Dr. Ehrhart who holds a permit for marine turtle research in the project area. After this date, work did not begin until beaches with nests were marked and the "all clear" was given for working on the beach with heavy equipment. No nests were relocated during the project. Accordingly, the contractor was able to avoid negative impacts to turtles and their nests.

At four sites in the project area (8035 A1A, 3725 A1A, 3037-3045 A1A and 107-175 A1A), large geotextile sand filled containers have been previously installed under the beach and/or dune by the property owners. These sites were marked prior to construction, and special care was taken by the contractor to avoid damaging the containers. Work at these suites was directly supervised to document that >2 feet of sand cover was maintained between the container and the equipment transporting, placing and shaping the sand. Work at these sites was completed without incident.

In the Mid Reach, the County reported twelve storm water outfalls being present along the project shoreline. Each of these outfall sites were visited and photographed. The dune template was slightly modified seaward of exposed outfalls to avoid blocking water exiting the pipe.

Additionally, AMEC collected, labeled, and recorded representative sand samples from the stockpile staging sites and from the reconstructed dunes, in accordance with the Brevard County Beach Fill Sediment QA/QC Plan. After providing a “sample of the samples” to Brevard County, AMEC performed grain size analyses and color determinations on each dune sample (one sample per 1,000 cubic yard of sand placed). Carbonate content for these samples was performed by Scientific Environmental Applications Inc, under separate contract with Brevard County, and the results are included in the sample log found in Appendix V. All of the dune samples met the carbonate and color specifications, and most fell within the specified grain size distribution. The complete original testing results are presented in Appendix V. Of the 133 original samples tested, four exhibited up to 3.1% greater than the 5% standard to be captured by a #4 sieve. Three of the 133 original samples exhibited up to 1.6% greater than the County standard of <2.5% passing through a #200 sieve, but were well within the state requirement. In the instance of these samples, the County collected additional dune samples from approximately 100 feet north and south of the original sample locations. The results of these tests, also presented in Appendix V, indicate material in the area is compliant and that the original samples were atypical.

2.3 Final Report Preparation and Project Closeout

The 2008 Emergency Sand Berms Construction Project was constructed to contract specifications. Monthly engineering status reports (Appendix VIII) were completed for the Florida Department of Environmental Protection (FDEP) as required by the permit and provided to the County for submittal to FDEP. Final results are summarized below in Table 1.

Table 1 – Project Summary

Location	Approx. Volume Sand Placed (cubic yards)	Approx. % Sand Placed in Profile (sand in profile / sand placed X100%)	Total Permitted Sand Volume (cubic yards)
Staging Sites	126,674	N/A	140,000
R75.3-R118.5	95,777	100%	106,000
R118.5-R139	0	N/A	0
R139-R213	30,948	100%	34,000

* The 51 yd^3 difference (less than 1%) between the staging site sand volume (126,674 yds^3) and the total sand volume placed into profile (126,725 yds^3) is due to human variance in estimating off-road truck volumes.

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Brevard County
2009 Emergency Sand Berm Maintenance

SUMMARY REPORT

Submitted by:

AMEC Earth & Environmental, Inc.
150 Cocoa Isles Boulevard, Suite 203
Cocoa Beach, FL 32931

May 2009

6 May 2009

Mr. Mike McGarry
Brevard County
Natural Resources Management Office
2725 Judge Fran Jamieson Way – Building A
Viera, Florida 32940

Re: Project Summary Report
Emergency Sand Berm Maintenance 2009
Brevard County, FL
AMEC Project Number 5-6125-0000

AMEC Earth & Environmental, Inc. (AMEC) is pleased to submit this Summary Report for the 2009 Brevard County Emergency Sand Berm Maintenance project. This report includes a brief project description and task summary, along with appendices of project documentation.

Specifically, Appendix I presents sand volumes placed by waypoint. Appendix II presents sign-off approval documentation for the restored areas. Appendix III presents representative photographs and the project photo log. Appendix IV presents the daily sand volumes delivered by each truck to the stockpile sites and the truck bed measurements. Appendix V presents results of the sand quality testing specified by Brevard County. Appendix VI presents the digital maps with staging sites indicated. Appendix VII presents monthly engineering status reports completed for the Florida Department of Environmental Protection (FDEP) as required by the permit and provided to the County for submittal to the FDEP and Appendix VIII includes project engineer site inspection reports. Appendix IX includes Late Season Marine Turtle Nest Avoidance Documentation. Compact disks containing digital data files and project photographs are also included.

If you have questions, please do not hesitate to contact me. AMEC appreciates this opportunity to be of continuing service to Brevard County.

Very Respectfully,

AMEC Earth & Environmental, Inc.

Dianne Disney
Project Manager

cc: Kevin Bodge, Ph.D., P.E., Olsen Associates, Inc, Senior Engineer/Vice President
David Ott, P.E., AMEC Earth & Environmental, Inc., Vice President

Appendices

AMEC Earth & Environmental, Inc.
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CONSTRUCTION SUMMARY
EMERGENCY SAND BERM MAINTENANCE 2009
BREVARD COUNTY, FL

1.0 INTRODUCTION

The project site is along the Atlantic Ocean coastline within Brevard County, Florida; and extends for approximately 20 miles from the south end of Patrick Air Force Base to north of Sebastian Inlet. The two construction regions, R75.3 to R118.3 and R139 to R213, were north and south, respectively, of the South Reach Federal Shore Protection Project. The project involved transporting beach quality sand from inland borrow sources and placing the sand in a permitted profile to repair erosion damage to the engineered beach/dune. The project included repairing dune damage at less than six point five cubic yards per linear foot of shoreline.

2.0 PROJECT SUMMARY

2.1 Planning and Management

In January 2009, AMEC was contracted by Olsen Associates, Inc. to perform construction management and engineering services for the referenced project on behalf of Brevard County (County) Contract #260070-08-001. The project involved supervising the construction contractor, CKA, LLC, performing emergency truck haul and earth moving operations to repair erosive storm damage to portions of Brevard County's shoreline.

AMEC supervised the construction contractor's operations and provided daily reports of sand volumes hauled to the stockpile staging sites and sand placed in profile. AMEC also visually inspected each load of material for sand quality and reported any issues to the County. Reports were submitted in the format shown in Appendix I (Summary of Way Point Volumes). AMEC also reviewed the construction contractor's delivery tickets, and provided liaison with the County. AMEC concurrently coordinated for County approval as construction proceeded, and documented County acceptance on Area Completion Sign Off Sheets (Appendix II).

2.2 Construction Observation and Documentation

CKA, LLC placed approximately 161,000 cubic yards of sand in profile from January 19 to March 24, 2009 (see Appendix I). Sand was transported by tandem axle haul trucks and semi's from inland borrow sources to stockpile staging areas, and then distributed on the beach with off-road dump trucks. The sand was placed into profile with a bulldozer. Representative photo documentation and the final photo log are presented in Appendix III.

AMEC tracked sand quantities by counting each truckload delivered from the borrow source to each stockpile staging site, and each load placed on the beach. All truck beds were measured in the field to verify their volumetric capacity. As the sand was delivered, the load was verified from an elevated platform and a "percent full" was estimated for each load. This percentage was then multiplied by the truck's volumetric capacity, and the resulting number was recorded as the volume

delivered.

The delivered sand was inspected to observe that the material was beach quality, free of debris and passed in accordance with the benchmark samples that were given to AMEC by the County. Of the 8,563 sand haul truck loads recorded, 17 loads were recommended to be rejected by AMEC because the color of the material did not match the sand benchmark provided by the County. These loads were returned to the pit by the contractor before being unloaded and were not included as delivered volume.

Truck reports are included in Appendix IV. Due to different interpretations in estimating "percent full" for each truck, as well as losses and volume changes due to stockpile handling, relatively small (<.001%) differences existed between the quantity of sand recorded as delivered to the stockpile staging sites and the quantity of sand recorded as placed into profile.

Before beginning the project, Brevard County provided AMEC with a list of waypoints (Appendix I – Summary of Way Point Volumes) along with aerial photo maps that identified each way point (Appendix VI). Prior to sand placement, AMEC staked each way point segment. The placement volumes were measured between each pair of way points to match loss volumes provided by FEMA to the County.

Construction of this project began January 19th 2009 and outside of marine turtle nesting season, however it was noted that due to unusually cool weather some 2008 marine turtle nests remained incubating in the construction area in January 2009. To avoid impacting these nests a “Late Season Marine Turtle Nest Avoidance Plan” was developed by Brevard County to assure the remaining nests had sufficient incubation time. This plan was presented to representatives of the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission and agreed upon at the January 9, 2009 pre-construction meeting. In accordance with this Avoidance Plan, the contractor avoided placing sand around a 2008 nest found near Waypoint #163. A copy of the Avoidance Plan and related updates to the agencies are found in Appendix IX – Late Season Marine Turtle Nest Avoidance Documentation.

In accordance with the permit, early morning turtle surveys commenced on February 15, 2009. Turtle monitoring was performed by researchers from the University of Central Florida under the guidance of Dr. Ehrhart who holds a permit for marine turtle research in the project area. After this date, work did not begin until beaches with nests were marked and the "all clear" was given for working on the beach with heavy equipment. The first nest was laid on March 19 and was outside the active construction area. No nests were relocated during the project. Accordingly, the contractor was able to avoid negative impacts to turtles and their nests.

In the Mid Reach, the County reported that eleven storm water outfalls were present along the project shoreline. Each of these outfall sites were inspected and photographed. It was documented that five of these outfalls were blocked prior to emergency sand berm maintenance. The dune template was slightly modified seaward of the six exposed outfalls to avoid blocking water exiting the pipe.

AMEC collected, labeled, and recorded representative sand samples from the stockpile staging sites and from the maintained dunes, in accordance with the Brevard County Beach Fill Sediment QA/QC Plan. AMEC performed grain size analyses, color determinations and carbonate content on each dune sample (one sample per 1,000 cubic yard of sand placed). Of the 161 original samples, all of the dune samples met the color specifications and almost all (94%) fell within the specified grain size distribution, as further described below. Additionally, all the samples met the specification of <65% carbonate. The complete original testing results are presented in Appendix V.

For those samples for which only one sieve was discerned out of compliance and when the result on that sieve was within 1% of compliance for interior sieves (#10 through #140), or within ½% for the tailing #4 or #200 sieves and where the adjacent dune samples were in compliance, the sample results in question were not considered problematic and additional testing in that area was not undertaken; comprising 4 samples in total. Six samples (Sample #'s, 27, 54, 56, 57, 63 and 158) were found further out of compliance than these 1% or ½% allowances, or on two or more sieves, or with adjacent dune samples which also showed non-compliance. In the case of these samples, additional dune samples were collected approximately 100 feet north and south of the original locations and tested. The results of these tests, also presented in Appendix V, indicate material in the area is compliant and that the original samples were atypical.

To meet permit conditions, though not under the direct oversight of AMEC, compaction measurement, beach tilling and sea oat installation occurred after sand placement was completed. The County reported that beach tilling to a depth of 36 inches was completed between R75.3 and 118.5. Compaction measurements collected by University of Central Florida between R138 and R213 documented tilling in this area was not required. A seven foot wide band of sea oats was installed by Aquatic Plants of Florida Inc. on the dune slope seaward of existing vegetation along the entire project area. In total, 311,385 sea oats were installed.

2.3 Final Report Preparation and Project Closeout

The 2009 Emergency Sand Berm Maintenance Project was constructed to contract specifications (except for the minor out-of-compliance sieve results noted above). Monthly engineering status reports (Appendix VII) were completed for the Florida Department of Environmental Protection (FDEP) as required by the permit and provided to the County for submittal to FDEP. Final results are summarized below in Table 1.

Table 1 – Project Summary

Location	Approx. Volume Sand Placed (cubic yards)	Approx % Sand Placed in Profile (sand in profile / sand placed X100%)	Total Permitted Sand Volume (cubic yards)
Staging Sites	160,954	N/A	180,000
R75.3-R118.5	91,822	100%	103,000
R118.5-R139	0	N/A	0
R139-R213	69,132	100%	77,000

Mr. David Ott, PE, an AMEC Florida Registered Professional Engineer (#54514), performed a complete site inspection of the Brevard County Emergency Sand Berm Maintenance Project. The site inspection reports are included in Appendix VIII.

Brevard County, FL Engineered Berm Project

Summary of Previously Used Truck Haul Sand Sources, Construction Contractors and Unit Sand Costs

2005 Project

Contractors (3): RTK Constructors Inc,
JP Donovan
Philips and Jordan

Dec 2004 to April 2005

- 307,300 cy placed from R75.4 to R118.3
- 252,200 cy placed from R138 to R213

Price range $21.50 to $32.70 all inclusive cost per cubic yard to buy, haul and place sand in template. Variation in cost based upon contractor (3 used) and placement location. Approximate percentage of total project volume from each sand source is estimated below.

Sand Sources:

1) **A&B Dirt**, 777 South US 1, Oak Hill FL 32759. It has been reported that pit permit has expired and material has not been moved from this pit since 2006 (estimated 15% of total)

2) **Central Sand**, 4756 Merlot Drive, Rockledge FL 32955. This was the primary source of sand in 2005 (estimated 72% of total)

3) **Florida Rock Industries,** Astatula Florida (estimated 5% of total)

4) **Fischer and Sons,** Indian River County FL (estimated 8% of total)

2006 Project

Contractor: JP Donovan

Feb. to April 2006

- 127,584 cy placed from R75.4 to R118.3 [pay volume = 127,478 cy]
- 47,770 cy placed from R138 to R213 [pay volume = 47,145 cy]

Price $27.50 all inclusive cost per yard to buy, haul and place sand in template.

Sand Sources:

1) **Central Sand**, 4756 Merlot Drive, Rockledge FL 32955 (100%)

Continued on following page.

2008 Project

Contractor: CKA LLC

Feb. to April 2008

- 95,777 cy placed from R75.4 to R118.3
- 30,948 cy placed from R138 to R213

Price $19.80 all inclusive cost per yard to buy, haul and place sand in template. Approximate percentages of total project volume from each sand source are estimated below.

Sand Sources:

1) **Central Sand**, 4756 Merlot Drive, Rockledge FL 32955 This was the primary source of sand in 2005 but total yardage is unknown (estimated 5% of total).

2) **Fischer and Sons,** Indian River County FL (estimated 35% of total)

3) Monticedo CCD, Satellite Beach FL. This is not a typical borrow pit but rather a housing development on the barrier island that needed a large retention pond excavated. The beach contractor contracted to remove the sand while building the pond and paid the developer a fee. (estimated 60% of total)

2009 Project

Contractor: CKA LLC

Feb. to March 2009

- 91,822 cy placed from R75.4 to R118.3
- 69,132 cy placed from R138 to R213

Price $19.80 all inclusive cost per yard to buy, haul and place sand in template. Approximate percentages of total project volume from each sand source utilized in construction are estimated below.

Sand Sources:

1) **Fischer and Sons**, Indian River County FL (estimated 35% of total)

2) **Ranch Road Pit**, Indian River County FL (estimated 20% of total)

3) **Broadway Pit**, (owned by Rock Solid Rock) N. Brevard County (estimated 20% of total)

4) **Trout Creek**, permitted excavation from housing development SE Brevard County (estimated 20% of total)

5) **Pence Land Materials**, Palm Bay FL (estimated 5% of total)

Note – All construction costs listed above do not include permitting & engineering, construction management & supervision, post-construction reports and monitoring.