DEPARTMENT OF THE ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT

OF

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U. S. ARMY CORPS OF ENGINEERS

BEFORE

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COMMITTEE ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS

UNITED STATES SENATE

ON

Five Years Later: Examination of Lessons Learned, Progress Made, And Work Remaining from Hurricane Katrina

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Introduction

Madam Chair and Members of the Subcommittee, I am Lieutenant General Robert Van Antwerp, Chief of Engineers. Thank you for the opportunity to be here today to discuss the U.S. Army Corps of Engineers' (Corps) ongoing recovery, reconstruction, restoration and improvement efforts in the Greater New Orleans area.

The Corps has made significant progress on the Hurricane and Storm Damage Risk Reduction System (HSDRRS) in the last five years. Over 270 contracts have been awarded and over $9.0 billion obligated for the program; about 60% of these awards have gone to Louisiana-based businesses. It is significant that the awards include over $2.25 billion directly to Small and Disadvantaged Businesses, representing close to 30% of all contract obligations. The work continues at a rapid pace.

After Hurricane Katrina made landfall in August 2005, firm Administration commitment and quick Congressional action provided authority and appropriations that enabled the Corps to repair and restore 220 miles of the system to the pre-Katrina level of protection. The Corps and its partners are working to provide risk reduction from hurricane storm surges with a 1% chance of occurring in any given year (100-year risk reduction). The Corps operational goal is to have the physical features in place to defend against the effects of a 100-year storm by June 2011. Work will continue beyond 2011 to complete other features of the system such as the Southeast Louisiana Urban Flood Damage Reduction Project (SELA) and the Non-Federal Levees in Plaquemines Parish as well as the adaptable, permanent canal closures and pump stations at the Lake Pontchartrain outfall canals.

The Corps is using the overall resources of the entire Mississippi Valley Division and other Corps expertise across the Nation to deliver this essential system to the citizens of Greater New Orleans and Southeast Louisiana, and deliver on our commitment. Even beyond this internal effort, the Corps is leveraging the knowledge and capability of our partners in industry, architect-engineer firms, members of academia and international counterparts to develop and apply state-of-the-practice engineering solutions to the Greater New Orleans Hurricane and Storm Damage Risk Reduction System and across coastal Louisiana.

Hurricane and Storm Damage Risk Reduction System Status

The risk reduction system in the New Orleans area includes about 350 miles of levees and floodwalls, floodgates, canal closure structures, 78 pump stations and other structures. The Corps is improving the perimeter system comprised of the existing Lake Pontchartrain and Vicinity (LPV) and West Bank and Vicinity (WBV) projects that reduce risk to the most populous areas of Jefferson, Orleans, Plaquemines, St. Bernard, and St. Charles parishes. Improvements are also being made to the SELA project, an interior rainfall drainage system designed for a 10-year rainfall event.

Major features of the work include erecting surge protection barriers to reduce storm surges entering the Inner Harbor Navigation Canal (IHNC) and the Harvey and Algiers Canals, adding scour protection, replacing I-walls with stronger T-walls, repairing existing pump stations, storm proofing pump stations, improving interior drainage and improving the LPV and WBV projects to provide the 100-year level of risk reduction. The authorized and funded work also

incorporates certain Plaquemines Parish non-federal levees into the existing New Orleans to Venice hurricane risk reduction project and improves non-Federal levees in Terrebonne Parish.

At present, the design of the 100-yr risk reduction system (WBV and LPV) is over 92% complete. Nearly all environmental compliance documentation is complete, and 96% of the necessary real estate rights of entry have been provided by the State of Louisiana and Levee Authorities. Just a few of the 100-yr construction contracts remain to be awarded. We are intensely managing all ongoing construction. We are on track to be able to defend against the effects of a 100-year storm in June 2011. Work will continue beyond 2011 to complete all features of the entire program.

The Corps constructed five new safe rooms so pump station operators can operate the interior drainage system during storm events. The repairs of the Parishes' pump stations are complete and the storm proofing is 31% complete. The safe rooms and pump station repairs were all 100% federally funded. Designs are ongoing for the New Orleans to Venice – Non-Federal Levee improvements in Plaquemines Parish.
Upon completion of the 100-year HSDRRS, the greater New Orleans area will have the best perimeter defense in its history. Extensive modeling, lessons learned, and risk informed processes have enhanced the Corps' design criteria and on-the-ground construction. The system in place performed as designed during Hurricanes Gustav and Ike in 2008, withstanding a 12-foot storm surge.

The four Project Partnership Agreements (WBV, LPV, IHNC surge barrier and SELA) necessary to proceed with construction were signed with the Coastal Protection and Restoration Authority (CPRA). CPRA was created by the State of Louisiana to address these projects, as well as other coastal restoration issues in Louisiana. The Corps has also signed all deferred payment agreements with the State of Louisiana that extend the State's payments for the cost-shared portion of the work over a 30-year period. The state's estimated cost share is $1.70 billion, of which approximately $200 million is real estate acquisition and $1.5 billion is the state's deferred cash contribution. Federal funds appropriated for the program, totaling $14.45 billion, include $1.5 billion to finance the state's cost share until non-Federal funds are received.

In accordance with Section 2035 of the Water Resources Development Act, 2007 the Corps has implemented a robust independent external peer review of the HSDRRS. This includes the overall design criteria and their application during design and construction, the armoring manual, and the 1% Hydraulic Design Report. Unique studies are also part of the peer review plan and include the Barge Impact Study to analytically study the effects of barge impacts on floodwalls as well as the study to determine applications for Spiral Welded Pipe in foundation piles. The most complex projects such as the IHNC Surge Barrier, the West Closure Complex and the Permanent Pump Stations are receiving additional peer review during design and construction. In collaboration with local stakeholders, additional projects and applications are being included in the peer review process.

All Harvey Canal floodwall contracts (five), totaling about $340 million, are constructed. No federal protection previously existed along the east side of Harvey Canal. About 2.5 miles of floodwalls and one mile of levee along the east side of the Harvey Canal have been constructed. The Gulf Intracoastal Waterway (GIWW) - West Closure Complex, a surge barrier and pump

stations across the GIWW south of the confluence of the Harvey and Algiers Canal, will provide the 100-year level of risk reduction in 2011.

The Corps continues extensive efforts to include the public throughout the HSDRRS system construction. The Corps has hosted more than 300 public meetings in Jefferson, Orleans, Plaquemines, St. Bernard, and St. Charles parishes to listen to stakeholders and to obtain public comment into the development of the system. The Corps has also conducted numerous Industry Days with both small and large businesses, to obtain their input and to assure firms are able and ready to bid for construction awards.

Inner Harbor Navigation Canal (IHNC) Surge Barrier

One of the largest surge barriers in the world, nearly two miles long, the state-of-the-art Inner Harbor Navigation Canal Surge Barrier Project at Lake Borgne includes a concrete pile-supported wall across the Gulf Intracoastal Waterway to the Mississippi River Gulf Outlet and three gated structures. The Corps' largest-ever Design-Build civil works construction contract, the IHNC Surge Barrier will provide flood risk reduction to the Ninth Ward, Gentilly, New Orleans East, Orleans Metro, and St. Bernard Parishes.

The project has navigational safety features and a more robust barrier wall to meet new design criteria, and added nourishment of 705 acres of marsh to meet Louisiana Coastal Zone Management standards. After just 15 months of construction, the project is now about 75% complete. The nearly 2-mile wall and the barge gate are complete and work continues on the remaining gates and tie-ins to the floodwalls at each end of the structure. This project is on track to be able to defend against the effects of a 100-year storm in June 2011.

The Lake Pontchartrain (Seabrook) Floodgate, a surge barrier that is also part of the IHNC corridor surge risk reduction, was awarded for pre-construction services under an Early Contractor Involvement contract. Construction will begin in September, and will have the coffer dam or the sector gates in place features that will defend against the effects of a 100-year storm in June 2011. Overall completion of this project's elements is scheduled for later that year.

Gulf Intracoastal Waterway--West Closure Complex (GIWW – WCC)

In May 2009, the Corps awarded an Early Contractor Involvement (ECI) contract for the GIWW-West Closure Complex. A major feature of the 100-year system, it will reduce risk for west bank portions of Jefferson, Orleans, and Plaquemines parishes by removing over 25 miles of levees, floodwalls, gates and pumping stations along the Harvey and Algiers Canals from exposure to storm surge. ECI allows the construction contractors to review and provide input to the project during the design phases, and to order long-lead-time items such as pump motors and drivers and foundation piles in advance of starting physical construction.

This project abuts the 3,200 acre Bayou aux Carpes wetland. In 1985, the U.S. Environmental Protection Agency (EPA) restricted the discharge of dredged or fill material in Bayou aux Carpes to prevent unacceptable adverse effects on shellfish beds and fishery areas, wildlife, and recreational areas. Working closely with the EPA, navigation interests, local government and non-governmental organizations, the Corps developed a plan for the West Closure Complex that would minimize impacts to the Bayou aux Carpes protected area. In May 2009 the Corps

received approval for a modification of the EPA Final Determination for actions proposed as a part of the Gulf Intracoastal Waterway --West Closure Complex project.

The project includes construction of a surge barrier spanning the GIWW south of the intersection between the Harvey and Algiers Canals, configured with structures for vessel traffic on the GIWW and a pump station containing the largest drainage pump stations in the world for rainwater intercepted when the structure is closed during storm events. Construction began in August 2009. This project is on track to be able to defend against the effects of a 100-year storm in June 2011. The overall construction of the pump station is scheduled to be completed in 2012. After only 1 year of construction, the project is about 40% complete.

Permanent Protection for Outfall Canals

Public safety is our first priority and the Corps is committed to providing a permanent solution for robust perimeter protection at the three Outfall Canals. Interim Closure Structures and Pump Stations at the three outfall canals (17th Street, Orleans Ave. and London Ave.) currently provide 100-year level of risk reduction, but these are not permanent facilities. These facilities were designed and built in 2006 with an estimated project life of five to seven years. The operational effectiveness of this system design and these facilities was demonstrated during Hurricanes Gustav and Ike in 2008 when the gates and pump stations successfully operated in concert with the city's pumps at the interior ends of the canals.

Operational Safe Water Elevation limits have been established for each canal to ensure stability of the canal walls in support of the New Orleans Sewerage and Water Board's operational requirements for pumping rain water out of the city. The Corps, working with its state and local partners, is completing a rigorous re-analysis of the floodwalls that parallel the canals to determine what actions should be taken to address any areas of concern and remediate those areas to ensure the Sewerage and Water Board can pump unimpeded under normal lake conditions. The Corps is committed to completing all necessary remediation work in the summer of 2011.

The Corps is authorized and funded to construct permanent gated pumping stations at or near the mouths of 17th Street, Orleans and London Avenue Canals that work in series with existing Drainage Pump Stations operated by the Sewerage and Water Board of New Orleans. The Corps will include adaptable design measures in the permanent pumping stations, such as deepened sills, that are within current authority and funding. This will ensure that no large work element would have to be removed or replaced if other options are eventually authorized, funded and constructed. The Individual Environmental Report (IER) Decision Record for the Permanent Canal Closures and Pumps was signed in June 2009, satisfying the National Environmental Policy Act requirements. The Corps is currently in the second phase of the contracting process and is scheduled to award a design-build project for this work in April 2011. Construction completion is expected in fall 2014.

St. Bernard Levees and Floodwalls

Following Hurricane Katrina, about 80% of the St. Bernard Parish levees were either repaired or constructed to achieve the pre-Katrina authorized elevation. After evaluating several alternatives and conducting a rigorous public involvement process, the Corps determined that T-walls on top

of existing levees provided the most effective, timely, and cost-effective solution to provide 100-year risk reduction in this area. The Record of Decision for Individual Environmental Report (IER) 10, signed in May 2009, advances the plan to construct 23 miles of floodwalls in St. Bernard Parish. All five floodwall contracts for the St. Bernard Parish were awarded this spring. Construction is proceeding at the rate of about two miles per month and is scheduled to be completed in 2011. This project is on track to be able to defend against the effects of a 100-year storm in June 2011.

Eastern Tie-In

The Eastern Tie-In project will tie the 100-year HSDRRS into the Mississippi River levee just south of Oakville on the eastern side of the system on the west bank. As a result of substantive public comments, the Corps extended the public review period for the Individual Environmental Report Number 13 to address the pros and cons of potential alternatives to the proposed alignment. All three contracts were awarded this summer. The Corps is now building a floodwall with a gate to provide risk reduction across Highway 23 and is scheduled to be complete in 2011. This project is on track to be able to defend against the effects of a 100-year storm in June 2011.

Southeast Louisiana Urban Flood Control Project (SELA)

While completion of the SELA projects is not a requirement to provide 100-year risk reduction to the Greater New Orleans area, it will improve the system's ability to handle interior drainage. Since Katrina, the Corps has awarded 12 SELA contracts for interior drainage projects with a total worth of nearly $230 million. Eight of the 12 contracts are complete, and one of the remaining contracts is scheduled to be completed this year. The other three are scheduled to be completed by the summer of 2012.

Overall, the Corps has awarded 52 of 74 SELA contracts. Work in Jefferson and Orleans Parishes is approximately 60 percent complete, and remaining work is scheduled to be completed in 2016.

Grand Isle

At Grand Isle, the Corps recently completed a $26 million program that reconstructed about six miles of sand dunes with a geo-textile tube core/sand cap. Construction began in May 2009 and was completed in April 2010. The tubes were filled with sand removed from excavation of the existing dune. The sand cover and beach nourishment portion of the project was dredged from an offshore borrow site. This project will reduce the impact of storm surges to the island residents and structures. The geo-tube core of the dune will enhance the sustainability of the dune when subjected to hurricane forces.

Terrebonne Parish

In June of 2006 in Public Law 109-234, Congress authorized and appropriated $30 million for the Corps to repair, replace, modify, and improve the nonfederal levees and the associated

protection measures in Terrebonne Parish. The completion of this project in July 2009 advanced the Terrebonne Parish Consolidated Government's plan of improving the Terrebonne Parish nonfederal levees.

Armoring

Since Katrina the Corps has undertaken a concerted effort to improve standard armoring methods and is working with academia to research the use of various armoring materials. Armoring adds resiliency to a levee and can reduce erosion and scouring of back slopes when wave overtopping occurs. About 420 transition spots (where a floodwall meets a levee) have been or are in the process of being armored. The ongoing research will help determine where and if additional measures other than grass cover may be needed to help make levees more resilient to wave overtopping. The research and development effort is expected to complete by end of this calendar year, and additional armoring on completed earthen levees will begin in 2011.

Co-located Mississippi River Levees

The WBV Mississippi River Levee/Hurricane Storm Damage Risk Reduction System co-located project is located along the Mississippi River in parts of Plaquemines and Orleans Parishes. This is an approximately 15 mile stretch of the Mississippi River where the levee serves two purposes, to protect against a high water river event and to reduce the risk from storm surge events that promulgates up the river during a tropical storm. The Corps has completed a hydrological analysis on the co-located Mississippi River Levees and will use a new technique to raise and cap portions of the Mississippi river levees with a stabilized soil mixture that has been successfully used on levees in Vicksburg, Mississippi, and Memphis, Tennessee. The raising and capping of these levees will provide 100-year level of risk reduction from storm surge that may promulgate up the river by June 2011.

Plaquemines Parish and New Orleans to Venice Non-Federal Levees

The Corps is engaged in two separate Federal projects on a complementary timeline that will reduce risk in Plaquemines Parish below Oakville, outside the 100-year HSDRRS. The Plaquemines Parish Non-Federal Levee project includes replacing or modifying 32 miles of current levees between Oakville and St. Jude on the west bank of the Mississippi River and constructing 2 miles of earthen levees from the ground level. When completed in 2014, these levees will be part of the New Orleans to Venice Federal levee system. The New Orleans to Venice project is completing existing Federal levees on the east bank from Phoenix to Bohemia, and on the west bank from St. Jude to Venice and is scheduled for completion in 2014. The projects are currently in design and are going through the environmental compliance process in accordance with NEPA.

Mississippi Activities

When Hurricane Katrina came ashore, the counties of Hancock, Harrison and Jackson in Mississippi received storm surges up to 28 feet as the eye of the storm went through western Hancock County with 120 mile-per-hour winds. It is believed this is one of the largest tidal surges ever recorded in the United States. The physical devastation in Mississippi was tremendous.

Congress directed the Corps to design comprehensive improvements and modifications to the Mississippi coastal counties for hurricane storm damage risk reduction, preventing saltwater intrusion, preserving fish and wildlife habitat and preventing erosion and for other related water resource purposes. This direction came in two forms, one was to identify short-term projects and the other was to look at the long-term effort. This is the Mississippi Coastal Improvements Program (MsCIP).

The criteria required the projects to be designed quickly, easily accomplished and with total state, local and community support for the short-term. After meeting with residents, elected officials, business representatives and the scientific community, 180 projects were identified. Of these 180 projects, 15 projects were selected for the short-term recovery effort. That Interim Report was submitted in December 2006 and to date all fifteen have been completed or are underway. These projects included hurricane and storm damage risk reduction, ecosystem restoration and flood damage reduction.

The full MsCIP Comprehensive Plan goals are to minimize risk to loss of life and safety; restore environmental resources; implement cost effective measures to reduce damages from hurricanes and storms without encouraging re-development in high risk areas; mitigate damage caused by salt water intrusion; seek cost effective ways to restore eroded coastal resources such as barrier islands and wetlands and identify other water resources related programs.

The Chief's Report for the Mississippi Coastal Improvements Program was submitted to Congress in January 2010. This Comprehensive Plan is a unique approach of structural and non-structural features, which include environmental features such as coastal wetland restoration; forest restoration; submerged aquatic vegetation restoration; coast-wide beach and dune restoration; structural elements such as flood proofing, levee protection to Forrest Heights, barrier island restoration, and the High Hazard Area Risk Reduction Plan (HARP) which proposes purchasing approximately 2000 properties located in high hazard zones of the three counties from voluntary sellers.

In June 2009, Congress authorized the Barrier Island and environmental restoration elements of the Comprehensive Plan and provided $439 million of the Federal share of MsCIP for this work. I am happy to report these are underway and, to date, have not been affected by the Deepwater Horizon incident. The complete Comprehensive Plan is awaiting authorization and appropriations from Congress to move forward.

The MsCIP and Louisiana Coastal Protection and Restoration (LACPR), were part of a system modeling analysis. While being accomplished by two different districts and divisions they were fully coordinated with each other to ensure efforts complement each other and do not cause inadvertent negative effects to either State.

Coastal

Since Hurricane Katrina, the Corps has been involved in leading a number of simultaneous efforts located on or near the Mississippi Gulf Outlet (MRGO). The comprehensive plan for deauthorization of deep draft navigation was completed in 2008. The MRGO channel was officially closed to all navigation in April 2009 and the physical construction (using about

350,000 tons of rock) was completed in July 2009. A study to identify the best ways to restore wetlands affected by the MRGO is currently underway. Feasibility scoping meetings for this study have already taken place, and the Corps plans to complete the feasibility-level design and release a draft report for public comment and peer review in 2010.

The Corps is also engaged on several other fronts, primarily under the Louisiana Coastal Authority (LCA) and the several authorities that support the ongoing effort to restore the coastal ecosystem. The ecosystem restoration activities are conducted under multiple authorities, with funding from varying sources and an array of different cost-sharing formulas. They include: (1) the Coastal Wetlands Planning, Protection and Restoration Act; (2) a LCA ecosystem restoration program; (3) a related effort to restore wetlands affected by the MRGO; and (4) the science needed to support all of these related ecosystem restoration efforts. Coastal protection and restoration and marshland creation provide another of the multiple lines of defense against hurricane surge.

The Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report provides a description of a variety of alternatives for effectively attaining increased levels of risk reduction through coastal protection and restoration throughout five planning units across the Louisiana coast. The evaluation presented in the final technical report quantifies and compares beneficial values and tradeoffs associated with each of the final plans. Plans include one or more of three types of risk reduction measures: structural, nonstructural, and coastal restoration. LACPR will be an effective tool to enable Louisiana to develop long range plans to provide multiple lines of defense for its coast. On June 30, 2010 the Assistant Secretary of the Army (Civil Works) transmitted the LACPR Final Technical Report to the U.S. Congress. Currently the Corps has team members embedded with the State of Louisiana team that is updating the State Master Plan.

This concludes my testimony, Madam Chair. Again, thank you for allowing me to testify today. I will be happy to answer any questions you or the other Members may have.