DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, US ARMY CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NEW YORK 11252-6700

REPLY TO
ATTENTION OF

CENAD-PD-PP

DEC 11 2012

MEMORANDUM FOR Commander, New York District, ATTN: CENAN-PL

SUBJECT: Review Plan Approval for South Shore of Staten Island, NY Storm Damage Reduction Study

1. The attached Review Plan for the subject study has been prepared in accordance with EC 1165-2-209, Civil Works Review Policy.

2. The Review Plan has been coordinated with the Coastal Storm Damage Reduction Planning Center of Expertise of the North Atlantic Division, which is the lead office to execute this plan. For further information, contact Mr. Larry Cocchieri at 347-370-4571. The Review Plan includes independent external peer review.

3. I hereby approve this Review Plan, which is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

Encl

KENT D. SAVRE
Colonel, EN
Commanding

REVIEW PLAN

South Shore of Staten Island, NY Storm Damage Reduction Study

New York District

MSC Approval Date: January 2008
Last Revision Date: November 2012

US Army Corps
of Engineers ®

REVIEW PLAN

South Shore of Staten Island, NY Storm Damage Reduction Study

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the South Shore of Staten Island, NY Storm Damage Reduction Study.

This review plan presents the process that assures quality products for the South Shore of Staten Island Storm Damage Reduction Study. This QC and ITR plan defines the responsibilities and roles of each member on the study and technical review team.

The product to be reviewed by the technical review team is the feasibility-level South Shore of Staten Island Storm Damage Reduction Study. Under the provisions of new U.S. Army Corps of Engineers (USACE) policy, as detailed in EC1105-2-408 dated May 31, 2005, the ITR will be conducted by specialists from organizations outside of the district responsible for the study. ITR will be conducted for all decision documents and will be independent of the technical production of the project. This QC and ITR plan is, by reference, a part of the project management plan.

b. References

(1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010
(2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2010
(3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
(4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
(5) EC II 05-2-408 "Peer Review of Decision Documents" (May 31, 2005)
(6) EC 1105-2-407 "Planning Models Improvement Program: Model Certification" (May 31, 2005)
(7) EC 1105-2-409 "Planning in a Collaborative Environment" (May 31, 2005)

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is *North Atlantic Division, CSDR-PCX.*

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies.

3. STUDY INFORMATION

a. Decision Document. The Decision Document for the South Shore of Staten Island, NY Storm Damage Reduction Study is a Feasibility Report. The study area is located along the south shore of Staten Island New York City, New York.

This study is authorized by a resolution of the US House of Representatives Committee on Public Works and Transportation, adopted 13 May 1993. The purpose of this study is to identify possible solutions to hurricane and storm damages in the area, and to determine whether Federal participation is warranted in constructing shore protection measures.

The level of approval for the document is the Chief of Engineers and will require Congressional authorization. The National Environmental Policy Act (NEPA) documentation will be an Environmental Impact Statement (EIS) which will be prepared along with the document.

b. Study/Project Description. The study area covers about 13 miles of coast on Staten Island, extending along lower New York Bay and Raritan Bay from Fort Wadsworth to Tottenville at the mouth of Arthur Kill. The area has a long history of storm damage. The shoreline experienced major erosion and storm damage from the Northeaster of December 1992, the March 1993, and most recently, Hurricane Sandy in October 2012. These storms caused evacuations in several communities, damage to hundreds of structures from flooding, and loss of over hundreds of structures from erosion. The December 1992 storm caused damages estimated at $5,000,000. The loss of beachfront now leaves the area increasingly vulnerable to severe damages even from moderate storms. Damages have not yet been estimated for the October 2012 coastal storm event.

However, as a result of the October 2012 storm event, the following design recommendation(s) will need to be re-evaluated:

Design Sections

1. Preliminary designs were completed to a level of detail which would allow preliminary cost estimates to be performed. These assessments are based on typical design sections as described in the following paragraphs.
2. A typical constructed beach fill is shown in Figure 3. The beach has a wide berm area backed by a higher dune. The beach and dune are designed to protect against storm tides and storm recession (storm induced erosion).

Beach Fill/Dune Sections

Beach Fill/Dune Sections - Fort Wadsworth to Oakwood Beach

3. The beach section from Fort Wadsworth to Oakwood Beach was designed to provide a 100-year level of protection. For the beach nourishment alternative from Fort Wadsworth to Oakwood

Beach, the dune crest was set at an elevation of +17.0 ft NGVD, with a crest width of 40 ft. The dune's fronting berm was set at an elevation of +11.0 ft NGVD, with a berm width of 75 ft.

4. At Oakwood Beach, the dune crest was set slightly higher, at an elevation of +18.0 ft NGVD. The crest width of 40 ft remained the same; however, the dune's fronting berm was designed to be somewhat narrower and lower with a berm width of between 15 and 20 ft at an elevation of +9.0 ft NGVD.

Beach Fill/Dune Section – Crescent Beach

5. At Crescent Beach, a beach berm crest was designed to provide 25-year level of protection. The crest elevation is established at el. +11.2 ft NGVD and is 60 ft wide.

Beach Fill Section - Annadale Beach

6. The beach section at Annadale Beach has been designed to provide a 100-year level of erosion protection to the existing bluffs. The beach berm elevation is 10 ft NGVD and varies in width. There is no constructed dune.

Levee/Floodwall Sections

7. A typical levee is a trapezoidally-shaped earthen structure designed to act as a barrier against flooding. The levee material may vary and some levees have an impermeable core or a sheetpile cutoff to prevent seepage of floodwater through the levee.

8. The preliminary levee design section has a top elevation of between 13.0 and 15.0 feet NGVD. An impervious core material (cutoff wall) is recommended for the entire length of the levees. The impervious core will extend from the top of the levee to approximately five (5) feet below grade to prevent seepage through and under the levee. The levee top width is 10.0 ft and the proposed levee side slopes are 2.5 on 1 (see Figure 4).

9. The most common types of floodwalls are cantilevered I-type and T-type concrete floodwalls. The I-type walls generally derive their stability from steel sheetpiling while the T-type walls use a large concrete footing for stability. I-type floodwalls are usually applicable where the height of the floodwall is less than 10 feet above grade, while T-type floodwalls may be used for higher applications.

10. The preliminary floodwall design section is a sheet pile I-type floodwall consisting of vertically-driven steel sheet piles with concrete cap. This type of floodwall is selected for the narrow restricted areas and typical wall heights range from five to ten feet above grade. The sheet pile extends below grade to provide structural stability and to control seepage under the floodwall (See Figure 5).

Levee/Floodwall Sections – Fort Wadsworth to Oakwood Beach

11. The crest elevation, for earthen levee and floodwall design for tiebacks were developed as follows:

    - For levee/floodwall within 1,000 ft of the shoreline, sea level rise (0.7 ft) and the full wave setup (2.0 ft) was used and rounded up to elevation +15.0 ft NGVD.
    - For levee/floodwall from 1,000 ft to 2,000 ft, an estimated half of the wave setup (1.0 ft) and sea level rise (0.7 ft) was used and rounded up to elevation +14.0 ft NGVD.
    - For levees further landward, 0.5 ft of wave setup and 0.7 ft of sea level rise was used for an elevation of +13.0 ft NGVD.

12. The earthen levee will have a 10 ft crest width and 1 on 2.5 side slopes. Side slopes exposed to the Bay will be protected from scour using vegetation reinforced with a geotextile. The floodwall will consist of a concrete capped (above grade) cantilevered steel sheet pile.

Levee Section – Crescent Beach

13. The crest for the tie back levees paralleling 1,800 ft of shoreline is established at +11.2 ft. The levee slopes are 2 on 1, with the shoreline fronting toe slope and crest, lined with 1 ton stone for wave and surge scour protection. An underlying layer of bedding stone will prevent levee fill migration.

Seawall Sections

Seawall Sections – Fort Wadsworth to Oakwood Beach

14. The seawall alternative from Fort Wadsworth up to Oakwood Beach includes:

    - Concrete encased (above grade) cantilevered steel sheet piling, with a crest elevation of +17.5 ft NGVD fronting the boardwalk. This is equal to the height of the boardwalk deck.
    - Concrete encased (above grade) cantilevered steel sheet piling, with a crest elevation of +16.0 ft NGVD just landward of the promenade.
    - The buried stone seawall has a crest elevation +17.0 ft NGVD and is covered with native vegetation. Two layers of armor stone protect the seawall against the erosive forces associated with wave attack (see Figure 6).
    - Where space restrictions exist, a double line of structurally connected cantilevered steel sheeting, spaced 10 to 15 feet apart, filled with structural sand, and capped with timber capping, would be utilized. The crest elevation would be +17.0 ft NGVD. Fronting stone armor protection would be provided where necessary (see Figure 7)

Seawall Section – Crescent Beach

15. The stone seawall alternative for Crescent Beach has both a crest width and fronting berm width of 10 ft. The dune's crest elevation is set at +11.2 ft NGVD, while the fronting berm's elevation is set at an elevation of +4.0 ft NGVD. Armor stone would be provided to withstand maximum breaking wave conditions and a steel sheet pile cutoff wall would be used to prevent seepage.

Interior Flood Control

16. Included with any selected structural plan will be an interior flood control design. Various means of reducing residual flood damages as a result of interior runoff will be considered. All of these plans will include certain required "minimum facilities" such as drainage ditches, "natural" ponding areas and drainage structures through the line of protection. Typical drainage structures will include 18 inch pipes through the levee with a flap gate and sluice gate and will allow for the flow of the interior stormwater runoff through the proposed levees during non-storm, low stage condition. As a minimum, provisions will be made to handle runoff from all existing storm drains within the protected areas using a combination of the natural ponding areas behind the levees and the proposed drainage structures which penetrate through the levees and floodwalls. Continuous swales and ditches draining to the new drainage structures will be constructed where necessary to convey runoff to the outlets. During low exterior stages, runoff will be discharged into the Bay or creeks by gravity.

17. If levees and floodwalls are included in the final alternative, the need for additional facilities will be evaluated. Any improvements above the "minimum facilities" must be individually justified when comparing benefits to costs.

Building Retrofit

18. Building retrofit measures are nonstructural storm damage reduction alternatives designed to reduce damage and risks to existing development, without significantly altering physical coastal processes. For this report building retrofit plans have been developed for structures in the 25-year floodplain. These structures would be protected to the 100-year storm surge elevation.

19. For the purpose of this preliminary analysis, the following nonstructural alternatives were evaluated:

    - *Floodproofing*. Floodproofing is defined as the process of making changes or adjustments included in the design, construction, or alteration of a building that reduce damage to the building and its contents from flooding. There are two categories of floodproofing: wet floodproofing and dry floodproofing. *Wet floodproofing* refers to the protection of a building in a manner that allows floodwaters to enter and exit freely, in such a way that internal and external hydrostatic pressures are equalized. This equalization of pressures reduces the loads imposed on a structure during a flood and, in turn, reduces the probability of structural damage. *Dry floodproofing* is the process of protecting a building by sealing its exterior walls to prevent the entry of floodwaters. Dry floodproofing is practical only for buildings with walls constructed of flood-resistant materials and only where flood depths are low (no more than 2 to 3 feet).

    - *Elevation*. Elevation is defined as the process of raising a structure such that the main living area will be above the most severe and recurrent floods. In most cases, structures are separated from their foundations, raised on hydraulic jacks, and held by temporary supports while a new or extended foundation is constructed below. The living area is raised and only the foundation remains exposed to flooding. The new or extended foundation can consist of either continuous walls or separate piers, posts, columns, or pilings.

    - *Ringwalls*. Ringwalls are typically scaled-down levees or floodwalls applied to individual buildings, designed to prevent floodwaters from reaching the building. They are constructed in such a way that a flood prone structure is surrounded with a short wall designed to keep shallow floodwaters away from the structure. Gates or walkovers are provided for access. Ringwalls are beneficial because they protect the building without requiring substantial alteration to the structure. While ringwalls cannot be made to look like a natural landscape feature, they can be constructed in a way that will complement the appearance of the structure and its site.

20. The identification of proposed building retrofit measures was based upon building type, usage, and level of susceptibility to the effects of flooding. To develop building retrofit plans, a program was

developed and applied to the structures in the floodplain. The criteria used are shown in the attached flowchart (Figure 8). Typical floodproofing measures are illustrated in Figure 9.

Acquisition and Removal

21. Acquisition involves the purchase, or 'buyout', of a structure which is prone to frequent and severe flooding. After the structure is acquired, utilities are disconnected, the structure is demolished, debris is removed, and the site is restored to a 'natural' condition in accordance with local regulations. Two buyout plans were evaluated for the study area. For the first, it was assumed that all structures within the 10-year floodplain would be acquired. For the second, it was assumed that all structures subject to wave effects would be acquired.

c. Factors Affecting the Scope and Level of Review.

The PDT has completed an initial risk assessment associated with this project based upon five factors and rated the project quantitatively among five levels of project risk of failure ranging from low to high (risk score class). The PDT scored each Project Risk Item in the Review Plan Score Guide (Table 9.1) and calculated an overall Average Project Risk Assessment Score. The exact values of the scores were not as important as compared to what risk score class (low, medium, or high) the Average Project Risk Assessment Score was classified as. Based upon the PDT analysis, the project is medium in risk because it did not receive an overall high risk score.

The PDT considered previous District project experience when making this analysis. No attempt was made to tie this to a national scale of rating. The Project Schedule and Cost were assessed as a low degree of risk if they both remained flexible and a high degree of risk if the Project schedule and cost was fixed. Staff Technical Experience was assessed as a low degree of risk if the staff had a high level of beach erosion control and coastal storm damage reduction experience and a high degree of risk if the staff had a low level of experience.

d. This section should discuss the factors affecting the risk informed decisions on the appropriate scope and level of review. The discussion must be detailed enough to assess the level and focus of review and support the PDT, PCX, and vertical team decisions on the appropriate level of review and types of expertise represented on the various review teams. At minimum, this section should address:

- If parts of the study will likely be challenging (with some discussion as to why or why not and, if so, in what ways – consider technical, institutional, and social challenges, etc.); and

This study is challenging. The study area is large, the study is evaluating measures such as:

Item Description
Hydraulic Beach Fill
Dune Overwalks
Dune Grass
Terminal Groin (2 x 400'):
Armor Stone (6-8 ton)
Underlayer (1400#) and Bedding
Excavation and Backfill
Revetment: Armor (4 ton grouted)
Underlayer (800#)
Bedding
Grouted Riprap (Outfall Cap)
Seawall (720'):
Steel Sheeting
Steel Wales and Struts
Scour Stone (0.5 ton)
Compacted Fill
Timber Capping
Levee and Floodwall:
Compacted Impervious Fill
Concrete (incl. capping)
Steel Sheeting
Topsoil and Seeding
Soil Confinement Geoweb
Armor Stone (2 ton)
Underlayer and Bedding
Compacted Backfill
Reinforcing Vegetative Matting
Tide Gate Structure (22'x10'x15)
Closure Gates @ Existing Outlets
Beach Fill (Dune Reinforcement)
Seawall Surfacing
Steel Wales and Struts
Timber Capping
Tide Gate Structure@Oakwood Bch (22' x10'x15')
Reinforcing Vegetative Matting
Levee Soil Confinement Geoweb
Swing Gates: 30' x 4'
45' x 4'
Seawall Armor Stone (2 ton)
Underlayer and Bedding
Scour Stone (0.5 ton)
Compacted Fill

- A preliminary risk assessment of where the project risks are likely to occur and what the magnitude of those risks might be (e.g. what are the uncertainties and how might they affect the success of the project):

There are only two anticipated risks: 1) the unpredictability of the number and severity of future storm events impacting and 2) funding uncertainty.

- If the project will be justified by life safety or if the project likely involves significant threat to human life/safety assurance, consider at minimum the safety assurance measures described in EC 1165-2-209 including, but not necessarily limited to, the consequences of non-performance of project economics, the environmental and social well-being (public safety and social justice); residual risk; uncertainty due to climate variability, etc.: Since dune and berm beachfill cross-sections are included as possible structural solutions and are subject to design exceedence, a Safety Assurance Review (SAR) as part of a Type I IEPR is warranted due to the potential for risk to life safety involved in any CSDR study.

- If there is a request by the Governor of an affected state for a peer review by independent experts: There has not been such a request.

- If the project is likely to involve significant public dispute as to the size, nature, or effects of the project: Public dispute is likely

- If the project is likely to involve significant public dispute as to the economic or environmental cost or benefit of the project: It is anticipated that public issues may be significant and would require the preparation of an Environmental Impact Statement.

- If information in the decision document or anticipated project design is likely to be based on novel methods, involve the use of innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices: Standard methods of analysis will be employed including well-documented techniques for evaluating coastal and fluvial processes.

- If the project design is anticipated to require redundancy, resiliency, and/or robustness, unique construction sequencing, or reduced or overlapping design construction schedule: The project is likely to utilize standard equipment. The anticipated plan is expected to require redundancy, unusual resiliency and/or robustness, unique construction sequencing or reduced or overlapping design construction schedule.

b. In-Kind Contributions. The in-kind products and analyses to be provided by the non-Federal sponsor, the New York State Department of Environmental Conservation, include coordination in such matters as soliciting public involvement and local cost sharing support.

4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

a. **Documentation of DQC.** District Quality Control will be documented through the use of a Quality Control Report, which is managed in the New York District and signed by those members performing the DQC as well as the Division Chiefs of the major technical offices responsible for producing this report.

b. **Products to Undergo DQC.** Interim and final products and ultimately the Feasibility report and appendices and the EIS

c. **Required DQC Expertise.** The expertise of the DQC review team will consist of Section Chiefs and subject matter experts or regional technical specialists in the fields of Plan Formulation, NEPA compliance, and Engineering Design and Analysis as well as Real Estate.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

a. **Products to Undergo ATR.** ATR will be conducted on the draft re-evaluation report (including NEPA and supporting documentation) and final report (including NEPA and supporting documentation). Additional ATR of key technical and interim products, MSC-specific milestone documentation, and In-Progress Review (IPR) documentation, if such documentation becomes necessary, should occur depending on the study needs and the requirements of MSC/District Quality Management Plans. Where practicable, technical products that support subsequent analyses will be reviewed prior to being used in the study and may include: surveys & mapping, hydrology & hydraulics, coastal engineering, geotechnical investigations, economic, environmental, cultural, and social inventories, annual damage and benefit estimates, cost estimates, real estate requirements etc.

b. **Required ATR Team Expertise.**

An ATR Team Leader and four technical disciplines were determined to be appropriate for review of the products leading to the feasibility report and EA including: plan formulation, economics, environmental resources, and coastal engineering. All should be well versed in the conduct of

coastal storms risk management studies. Reviewers should be from outside the project district and the review lead should be from outside the project MSC.

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. Typically, the ATR lead will also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Plan Formulation	The Planning reviewer should be a senior water resources planner with experience in the plan formulation process. The reviewer should be familiar with evaluation of alternative plans for coastal storms risk management projects.
Economics	The economics reviewer should be a senior water resource economist with experience in coastal storms risk management projects.
Environmental Resources	The environmental resources reviewer should be a senior NEPA compliance specialist with experience in coastal storms risk management projects, particularly projects in urbanized coastal areas.
Coastal Engineering	The coastal engineering reviewer should be a senior engineer with experience with coastal storms risk management projects, particularly projects in urbanized coastal areas.

c. **Documentation of ATR.** DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

(1) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
(2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
(3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
(4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the draft report and final report. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-209, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II

IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.

- Type II IEPR. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

a. **Decision on IEPR.** The South Shore of Staten Island Feasibility study will require IEPR because the estimated cost of the project, including mitigation costs, exceeds $45 million. Type II IEPR/SAR is currently planned; however, the need for SAR will be revisited in a follow-on , implementation phase review plan.

b. **Products to Undergo Type I IEPR**. The product to undergo IEPR will be the draft/final Feasibility report.

c. **Required Type I IEPR Panel Expertise.** Four technical disciplines were determined to be appropriate for review of the draft feasibility report and EA including: plan formulation, economics, environmental resources, and coastal engineering. All should be well versed in the conduct of coastal storms risk management studies. Reviewers will be a panel from an Outside Eligible Organization (OEO).

IEPR Disciplines	Expertise Required
Plan Formulation	The Planning reviewer should be a senior water resources planner with experience in the plan formulation process. The reviewer should be familiar with evaluation of alternative plans for coastal storms risk management projects.
Economics	The economics reviewer should be a senior water resource economist with experience in coastal storms risk management projects.
Environmental Resources	The environmental resources reviewer should be a senior NEPA compliance specialist with experience in coastal storms risk management projects, particularly projects in urbanized coastal areas.
Coastal Engineering	The coastal engineering reviewer should be a senior engineer with experience with coastal storms risk management projects, particularly projects in urbanized coastal areas.

d. **Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key

parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The DX will assist in determining the expertise needed on the ATR team and Type I IEPR team and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The RMO is responsible for coordination with the Cost Engineering DX.

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

a. **Planning Models.** The following planning models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
TBD	***Environmental Model***	TBD
Spreadsheet model	*Commonly-used Application that calculates coastal damages to an inventory of structures*	Not certified

b. **Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
STWave: model of wave climate	This is a widely-used model. This is a software model that takes historic wind, fetch, and wave data to simulate the wave climate along a shoreline and probabilistically predict wave action and surge elevations into the future.	not certified; CoP-preferred
spreadsheet model for storm damages on bulkheads and structures behind them	This is widely used by New York District. This model uses wave equations and assumptions of wave scour from the USACE Shore Protection Model, and wave overtopping equations recommended in USACE EM-1110-2-1614 "Design of Coastal Revetments, Seawalls, and Bulkheads" to simulate failure conditions for bulkheads and wave undermining of roads.	not certified and not CoP-listed, referenced in Shore Protection Manual
EDUNE	This is widely used by New York District. This model calculates erosion and wave climate prediction, and is based on the equilibrium profile theory, as is the Corps model, SBEACH. The erosion prediction is utilized in simulating structure undermining.	not certified and not CoP-listed; developed after the Shore Protection Manual

10. REVIEW SCHEDULES AND COSTS

a. **ATR Schedule and Cost.** The estimated schedule for ATR has ATR next taking place for the submission of the draft report, in 2014. The ATR budget of $50,000 includes participation of the ATR Lead in milestone conferences and the Civil Works Review Board (CWRB) meeting to address the ATR process and any significant and/or unresolved ATR concerns.

b. **b. Type I IEPR Schedule and Cost.** The estimated schedule for IEPR has IEPR taking place for the submission of the draft report, in 2015. The IEPR budget of $250,000 includes participation of the IEPR Lead in the Civil Works Review Board (CWRB) meeting to address the IEPR process and any significant and/or unresolved IEPR concerns.

c. **Model Certification/Approval Schedule and Cost.** Not-Applicable

11. PUBLIC PARTICIPATION

There have been and will be opportunities for public comment. Public comments and questions will be made available in the final EIS. The EIS will be scoped in accordance with regulation.

12. REVIEW PLAN APPROVAL AND UPDATES

The CENAD Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

Public questions and/or comments on this review plan can be directed to the following points of contact:

- TBD
- Christopher Ricciardi, MSC, 347-370-4534
- Lawrence Cocchieri, RMO, 347-370-4571

ATTACHMENT 1: TEAM ROSTERS

Project Manager	Frank Verga		
Chief, Coastal Section	Steve Couch		
Project Planner	TBD		
Coastal Engineer	TBD		
Technical Manager			
Economist	TBD		
Biologist	TBD		
Chief, Environmental Section	TBD		
Cultural Specialist	TBD		
Real Estate Specialist	TBD		

ATR Team Members to be designated by the PCX - CSDR

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *<type of product>* for *<project name and location>*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

SIGNATURE _____ Date _____

Name
ATR Team Leader
Office Symbol/Company

SIGNATURE _____ Date _____

Name
Project Manager
Office Symbol

SIGNATURE _____ Date _____

Name
Architect Engineer Project Manager[1]
Company, location

SIGNATURE _____ Date _____

Name
Review Management Office Representative
Office Symbol

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *Describe the major technical concerns and their resolution.*

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE _____ Date _____

Name
Chief, Engineering Division
Office Symbol

SIGNATURE _____ Date _____

Name
Chief, Planning Division
Office Symbol

[1] Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
15 November 2012	Update to 2012 format	all

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control/Quality Assurance	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIS	Environmental Impact Statement	PDT	Project Delivery Team
EO	Executive Order	PAC	Post Authorization Change
ER	Ecosystem Restoration	PMP	Project Management Plan
FDR	Flood Damage Reduction	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
Home District/MSC	The District or MSC responsible for the preparation of the decision document	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	RTS	Regional Technical Specialist
ITR	Independent Technical Review	SAR	Safety Assurance Review
LRR	Limited Reevaluation Report	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act

CENAN-EN 5 December 2012

MEMORANDUM FOR RECORD

SUBJECT: Feasibility Study for the South Shore of Staten Island, NY, Coastal Storm Risk Management– Risk Informed Assessment of Significant Threat to Human Life

1. **Study/Project Information.** The study area covers about 13 miles of coast on Staten Island, extending along lower New York Bay and Raritan Bay from Fort Wadsworth to Tottenville at the mouth of Arthur Kill. The area has a long history of storm damage. The shoreline experienced major erosion and storm damage from the Northeaster of December 1992, the March 1993, and most recently, Hurricane Sandy in October 2012. These storms caused evacuations in several communities, damage to hundreds of structures from flooding, and loss of over hundreds of structures from erosion. The December 1992 storm caused damages estimated at $5,000,000. The loss of beachfront now leaves the area increasingly vulnerable to severe damages even from moderate storms. Damages have not yet been estimated for the October 2012 coastal storm event. Currently, the following is the recommended design summary. However, as a result of the October 2012 storm event, the following design recommendation(s) will need to be re-evaluated.

2. **Study/Project Description.** The Decision Document for the South Shore of Staten Island, NY Storm Damage Reduction Study is a Feasibility Report. The study area is located along the south shore of Staten Island New York City, New York. This study is authorized by a resolution of the US House of Representatives Committee on Public Works and Transportation, adopted 13 May 1993. The purpose of this study is to identify possible solutions to hurricane and storm damages in the area, and to determine whether Federal participation is warranted in constructing shore protection measures in the study area that covers about 13 miles of coast on Staten Island, extending along lower New York Bay and Raritan Bay from Fort Wadsworth to Tottenville at the mouth of Arthur Kill.

3. **Risk Informed Assessment.** A Safety Assurance Review (SAR) as part of a Type I IEPR is typically warranted due to the potential for risk to life safety involved in any CSDR project. However, it is too early in the study process to accurately predict the level of risk involved to human life. In the case of this project, the Type I IEPR is required based on the estimated project cost which is estimated to exceed $45 million.

4. **Determination.** The risk informed assessment of significant threat to human life will be performed once the tentatively selected plan is identified and optimized prior to performing the SAR.

ARTHUR J. CONNOLLY, P.E.,
Chief, Engineering Division