

HAZARD MITIGATION PLAN

FOR

BOROUGH OF BAY HEAD

MAY 2017

Prepared For

**Borough of Bay Head
Ocean County
New Jersey**

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CHAPTER 1 - INTRODUCTION

This Hazard Mitigation Plan (The Plan) is being submitted on behalf of the Borough of Bay Head. This Plan includes information from the Ocean County Hazard Mitigation Plan. Topics covered include the community's needs and goals, new reports and supplemental information, hazard and vulnerability assessments, and review of the action plan to account for completed and new projects.

This Plan was created by the Borough Engineer, who regularly performs land use duties for the Borough with assistance from the Borough Code Official, Planning Board Planner, and Borough Floodplain Manager to ensure the plan addressed the immediate, as well as future, needs of the community. New hazard mitigation goals for the Borough are included in this Plan to address and reduce vulnerabilities from future storms.

Hazard mitigation planning has the potential to produce long-term and recurring benefits by breaking the cycle of loss. A core assumption of mitigation is that current dollars invested in mitigation practices will significantly reduce the demand for future dollars by lessening the amount needed for recovery, repair, and reconstruction. These mitigation practices will also enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the economy back on track sooner and with less interruption.

CHAPTER 2 - MISSION STATEMENT AND PURPOSE

This document is the Borough of Bay Head, County of Ocean, and State of New Jersey Hazard Mitigation Plan. It is prepared to guide reconstruction and redevelopment of the Borough to comply with County, State and Federal requirements for local mitigation planning and funding efforts.

The purpose of this plan is to evaluate the impacts of potential future storms and reduce vulnerabilities throughout the Borough. This plan discusses the planning goals, strategies,

and actions that are most urgently needed to improve public safety, increase resiliency, and stimulate recovery. Detailed descriptions of previous storms, current regulations, and proposed projects are discussed in this Plan.

CHAPTER 3 – FLOOD HAZARD POLICIES AND PROCEDURES

If a natural disaster affects the Borough of Bay Head, the Mayor and Council will meet as soon as possible thereafter to address post-mitigation policies and procedures. At that time, changes in policy and procedure which could mitigate the effects of future storms and projects which could alleviate flood damage will be discussed and evaluated for their potential benefits based on the most recent storm assessment. Recommendations may include storm amendments to the Flood Damage Prevention Ordinance or capital funding for a project to relieve a flooded area.

The Borough of Bay Head was involved in the development of the Ocean County Hazard Mitigation Plan. This Plan and the Ocean County Hazard Mitigation Plan shall govern disaster planning, mitigation and recovery for Borough of Bay Head. The County Plan was approved by FEMA on May 13, 2014. Borough of Bay Head has adopted the 2014 Multi-Jurisdictional All Hazard Mitigation Plan for Ocean County by Resolution #2014-91.

This Plan should continue to be periodically updated by the Borough Engineer and Borough of Bay Head staff.

CHAPTER 4 - COMMUNITY PROFILE AND ASSET INVENTORY

The Borough of Bay Head is a shore community situated on the Barnegat Peninsula, incorporated in 1886, consisting of an area approximately 0.700 square miles, or 448 acres, in the Northern part of Ocean County along the Atlantic Ocean and Barnegat Bay which is a long, narrow barrier island located at the head of Barnegat Bay running along the Eastern seaboard of the continental United States. The Borough is divided east and

west by Main Avenue (NJ Route 35) between the municipal border of Point Pleasant Beach Borough to the north and Mantoloking Borough to the south. This creates a beachfront and a bayfront area. The Borough is also bisected by Scow Ditch which is a small canal which connects Bay Head Harbor (Barnegat Bay) with Twilight Lake. The Borough is separated from the mainland by Bay Head Harbor (Barnegat Bay) and Point Pleasant Canal. The frontage is approximately 1.25 miles of oceanfront, approximately 0.75 miles of bayfront, and 1.2 miles of lake, tributary and lagoon frontage. Bridge Avenue (County Road 632) runs through the center of the Borough, connecting to Point Pleasant Borough to the west and Route 35 to the east.

According to the 2010 US Census, the Borough had a population of 1,238 residents in 2000 and 968 residents in 2010. This is a 21.8% decrease in a ten year period of time. Per the 2010 US Census, 15.5% of residents were under the age of 18, 4.3% were between 18 and 24, 12.9% between 24 and 44, 32.9% between 44 and 64 and 34.4% were 65 and over. Per the 2010 US Census, there were 954 that are white only, 5 African American, 0 American Indian or Alaska Native, 7 Asian alone, 0 Native Pacific Islander alone, 0 other race alone, and 2. Hispanic or Latino of any race were 1.03% (10) of the population.

The development of Bay Head started with the Bay Head Land Company back in 1879. Within several years, the resort had grown in population, with a seawall installed, roads built and land areas graded. In 1882, Bay Head had 20 new cottages and a population of 75. The Borough's population was at its peak in 1980 with a population of 1,340. The railroad was a major influence in the growth and socioeconomic situation for much of its history. The Borough of Bay Head consists primarily of detached single family residential dwellings and considered suburban development. There is a historic core of elegant and stately homes mixed with neighborhood commercial uses and public services. The Bay Head Historic District, listed in the New Jersey and the National Registers of Historic places in 2005, includes over 550 contributing structures (over half of the town's buildings) making it one of the largest historic districts in New Jersey. The commercial

properties are generally concentrated in the center portion of the Borough along Bridge Avenue and Mount Street. The Marine related uses are located along the Barnegat Bay waterfront.

As of May 2010, the borough had a total of 10.74 miles of roadways, of which 8.24 miles are maintained by the municipality, 1.16 miles by Ocean County and 1.34 miles by the New Jersey Department of Transportation. The New Jersey Transit trains terminate at the Bay Head station, with service on the North Jersey Coast Line to Penn Station New York in Midtown Manhattan. Historically, the railroad connected Bay Head Borough to Seaside Heights and then further to Philadelphia. The portion south of the Bay Head train station was abandoned in 1949.

CHAPTER 5 – HAZARD IDENTIFICATION

A. FLOOD MAP AND FLOOD ZONE INFORMATION

On March 28, 2014, FEMA released Preliminary Flood Insurance Rate Maps (PFIRMs) which updated the Flood Zones and Base Flood Elevations shown on the Preliminary Work Maps. The PFIRMs have been updated through January 30, 2015. An appeal was been filed in June 2015 and was upheld by the courts must in August of 2016. FEMA is currently conducting a new flood analysis and will be issuing revised Preliminary Flood Insurance Rate Maps. The current Preliminary Flood Insurance Rate Maps for Borough of Bay Head include the following flood hazard zones:

- VE Zone - Coastal areas of high flood risk subject to inundation by the 1% annual-chance flood event with additional hazards due to storm-induced velocity wave action (a 3-foot or higher breaking wave). Base Flood Elevations range from 10.0 feet to 17.0 feet.
- AE Zone - An area of high flood risk subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations range from 8.0 feet to 10.0 feet.

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- Shaded X Zone - Areas of moderate coastal flood risk outside the regulatory 1% annual chance flood up to the 0.2% annual chance flood level. No Base Flood Elevations exist in the Shaded X Zone.
 - LiMWA Zone - Limit of Moderate Wave Action – is the inland limit of area affected by waves greater than 1.5 feet.

B. NATURAL HAZARDS

Coastal Erosion is a process of shoreline recession due to natural or man-made causes. Erosion naturally results from sea level rise, flooding, strong wave action or large storms. It can also be caused by shore protection structures, inappropriate land use, and other alterations along the shoreline. There are two types of Coastal Erosion which are chronic erosion and episodic erosion. Chronic erosion is characterized as the gradual recession of the shoreline over a period of decades. Episodic erosion occurs in response to flood events or coastal storms with a rapid recession of the shoreline. Erosion can destroy personal, commercial, and public property along the coast. The Borough of Bay Head has 50 parcels located within 200 feet of erodible shoreline and beaches with an estimated dollar value of improvements of \$58,586,200.00.

1. DROUGHT

A drought is described as a period of low or no precipitation in a given area. Ocean County is divided into two drought regions. The Borough of Bay Head is within the Coastal North Drought Region. The County's low elevation and plentiful groundwater supply allow it to be less susceptible to drought. However, residents that use private wells are more vulnerable to droughts. Droughts endanger both the level of water in reservoirs and the quality of water where salt water intrusion can occur in the coastal areas of the Borough. In the Borough of Bay Head the NJDEP documented that less than 10 private wells were tested in 2013. New Jersey American Water provides information regarding

water quality for the Coastal North Region which includes the Borough of Bay Head. The information is contained within the following PDF:

<http://www.amwater.com/ccr/coastalnorth.pdf> for the annual water quality and provides contact information and additional resources.

2. EARTHQUAKES

An earthquake is the accumulated strain within the earth's crust that is suddenly released along a fault. The energy from this movement travels along and below the ground surface which is then released causing the earthquake. There are no documented occurrences of earthquakes in the Borough of Bay Head per the Ocean County Hazard Mitigation Plan's Earthquake History for 1919-2011. The possible future occurrence of earthquakes in Ocean County is less than 1% annually. This natural hazard does not have a large impact on the Borough of Bay Head.

3. EXTREME TEMPERATURES

The Borough of Bay Head has in the past experienced both extreme cold and extreme heat events.

Extreme cold events are periods of time when the temperature is 20 degrees or less for a period of three days or more. This can cause frostbite, hypothermia, influenza and pneumonia. Other hazards caused by cold temperatures are injuries from falling, accidents, carbon monoxide poisoning and house fires. It can cause the Bay and Lake to freeze. It may also cause pipes to freeze and burst in homes. Temperatures rarely reach below 20 degrees and this usually occurs in December, January and February. Usually heavy snowfall accumulations along coastal towns like the Borough of Bay Head are approximately fifteen inches. However a storm such as a nor'easter may cause an increase in accumulations. The Borough of Bay Head has procedures in place for severe storms through the Emergency Management Council.

Extreme heat events are based on summertime weather that is substantially hotter and more humid than average. These events are more threatening to people and other living things, and less threatening to property and structures. Prolonged exposure can cause heatstroke, heat exhaustion, heat syncope, sunburn, and heat cramps. Temperatures over 90 degrees generally occur in July and August. Prior to events, warnings and watches are issued by the National Weather Service to allow residents to be notified and plan accordingly.

Approximately 67% of the Borough of Bay Head's population is over the age of 45 years of age. The median age is 57.2 years. The elderly residents with no access to an air-conditioned environment are at the greatest risk of death during heat waves. Also, long periods of extreme temperatures can overstress power supply systems, resulting in brown outs or black outs, and leaving the community without means of cooling or heating their homes. The Borough of Bay Head has implemented procedures to notify their residents through the Emergency Management Councils webpage to reach out to the public in case of an emergency event. They also provide a phone number for residents to contact to discuss any special help needed during an emergency situation.

4. FLOODING

A flood is a natural event for rivers, streams, and coastlines. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows on the banks and adjacent floodplains.

The Borough of Bay Head has experienced more than a few severe storms over the past several years. The Borough's coastal location along the Atlantic Ocean and at the head of the Barnegat Bay is cause for flooding and erosion across much of the Borough. The Borough's primary concerns are from Nor'easters, hurricanes, storm surges, and tornadoes. Nor'easters and hurricanes usually travel along the coast of New Jersey and can cause storm surges along the oceanfront. Tidal levels cause flooding in several low

lying areas in the Borough. A Category 2 or stronger hurricane will cause severe, immediate flooding and damage. A weaker, slower moving storm lasting more than one high tide may not allow drainage of the Bay back into the ocean, which can cause devastating flooding situations to the Borough.

The Borough of Bay Head is subject to two forms of flooding, coastal or tidal flooding and flooding due to rainfall. Flooding occurs from Twilight Lake when waters rise higher than the existing elevation surrounding the lake. This frequently occurs during rainfall events, especially with high tide conditions and southerly winds. Coastal flooding occurs along the Atlantic Ocean in the barrier island portion of the Borough and along low lying areas adjacent to Barnegat Bay, Scow Ditch and Twilight Lake.

The Borough of Bay Head is located in the coastal plain region of New Jersey. The Borough includes 1.25 miles of oceanfront subject to wave action and storm surge and in excess of 0.80 miles of bayfront along the Barrier Island.

The FIRM maps for the Borough of Bay Head indicate a VE Zone up to elevation 15 along the Atlantic coast, AE Zone of elevation 5 and 6 along Barnegat Bay and other mapped AO +1 along the central part of the Borough.

The Borough of Bay Head's Flood Damage Prevention Ordinance defines the Limit of Moderate Wave Action (LiMWA) as areas that can experience 1 to 3 feet of wave action. There are three locations in the Borough of Bay Head that have homes within the LiMWA:

1. Along the easterly side of East Avenue.
2. West of Clayton and Lake Avenues.
3. South of Meadow Avenue.

The Preliminary FIRM of the Borough of Bay Head indicate that 372.89 acres lie within a Preliminary Flood Hazard Area, representing 98.75 percent of the total area of the

Borough of Bay Head (including water). There is 292.08 acres or 77.35% of the Borough within a Preliminary Zone AE, 75.65 acres or 20.03% of the Borough within a Preliminary Zone VE, and 5.16 acres or 1.37% of the Borough within a Preliminary Shaded Zone X. The map indicate VE Zones with Base Flood Elevations ranging from 10.0 feet to 17.0 feet, mainly along the oceanfront and a section of the bayfront at the southern part of the Borough. AE Zones are predominately inland in low lying areas along the barrier island, bayfront sections and areas along the lake ranging from 8.0 feet to 10 feet. Shaded X Zones are located to the northwestern corner of the Borough.

In addition to local land development ordinances, the Borough is also governed by the Coastal Area Facility Review Act (CAFRA) which is a NJDEP regulated area that requires special consideration. 100% of the Borough is within the jurisdiction of the Coastal Management Area (CAFRA).

5. AREAS OF CONCERN

The Borough of Bay Head has several areas of concern; they range from the beachfront, to the bayfront including Twilight Lake, the lagoon area and Scow Ditch. More specifically the following areas have been designated as areas of frequent flooding:

- Bridge Avenue – at Club Drive/Park Avenue
- Club Drive – from Bridge Avenue to Grove Street
- Park Avenue – from Bridge Avenue to Holly Avenue
- West Lake Avenue – North of Park Avenue
- West Lake Avenue – South of Meadow Avenue
- Lake Avenue – North of Harris Street
- Lake Avenue – at North Street
- Twilight Road – West of Lake Avenue
- Osborne Avenue – at Lake Avenue
- Lake Avenue – South of Howe Street
- Lake Avenue – at Forsyth Street

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- Johnson Street – at Lake Avenue
 - Clayton Avenue – at the Mantoloking border

The 2006 FIRM designated several types of floodplains. Beginning with the beachfront the flood zones are VE with base flood elevations of 13.0 to 15.0 feet referenced to the North American Vertical Datum (NAVD) 1988. The Borough's bayfront is denoted as AE with base flood elevations of 5.0 and 6.0 feet and also VE 10 Zone with a base elevation of 10.0 feet. Therefore, any tides reaching over 5 feet (NAVD 1988) must be considered for flooding. Although these areas remain the primary areas of concern for flooding, the latest flood studies reflect higher flood zones and depths.

On March 28, 2014, FEMA released Preliminary Flood Insurance Rate Maps (PFIRMs) which updated the Flood Zones and Base Flood Elevations shown on the Preliminary Work Maps. The PFIRMs have been updated through January 30, 2015. An appeal was filed in June 2015, was upheld by the courts. On October 17, 2016, FEMA and New York City officials agreed that the information submitted during the appeal warrants a revised approach to the underlying storm surge analysis for the PFIRMS. As a result of revising the approach, the Final FIRM maps are not anticipated to be adopted until roughly 2022. The Preliminary Flood Insurance Rate Maps for Borough of Bay Head include the VE Zone with Base Flood Elevations ranging from 10.0 feet to 17.0 feet. Also AE Zones with flood elevations ranging from 8.0 feet to 10.0 feet.

It shall be noted that FIRMs remain the predominate maps used by flood insurance companies; however, the Borough uses both the FIRMs and the Preliminary Maps to guide construction practices. The more restrictive of the two maps is used.

One of the Borough's major priorities is to raise roadways within the Borough. Based on the flood elevations indicated above the preliminary and effective firm maps indicate that the low lying roadways within the Borough are at elevations of 1 to 5 feet above sea level indicating that the low lying roadways are between 1 and 5 feet lower than the designated

flood elevations based on the current 2006 flood map. The preliminary maps indicate a worsening situation with the flood zone designations increasing. Survey of these critical roadways is recommended in order to prioritize road reconstruction and raising projects.

One such critical road is Bridge Avenue which is one of the two evacuation routes in the Borough. It floods frequently and is seldom able to be used as an evacuation route. Bridge Avenue at its lowest point is only 1 foot above sea level in accordance with FEMA Region II Coastal Analysis and Mapping “What is my BFE” tool. Addressing Bridge Avenue flooding is an area of great concern to the Borough.

6. STORM EVENTS

The following information was obtained from the Ocean County Records and the National Climate Data Center:

In February 1998 a nor’easter brings strong winds and minor to moderate flooding along the coast; the dune line was damaged by the powerful surf.

In September 1999, Hurricane Floyd brought heavy rains and damaging winds up to 60 miles per hour (mph) causing flash flooding.

On July 26, 2000 and August 27, 2001, thunderstorms and heavy rains at high tide resulted in flash flooding.

On February 12, 2006 a major winter storm caused coastal flooding and beach erosion due to strong onshore winds and high tides; significant to severe damage to dunes occurred.

On August 28, 2011, Hurricane Irene became the first hurricane to make landfall in the state of New Jersey since 1903. Ocean County was included in the Major Disaster Declaration signed by the president on August 31, 2011.

On October 29, 2012, Super Storm Sandy brought high winds, heavy rains and coastal storm surge to the State of New Jersey. At least 239 properties within Bay Head, including residences, businesses, and public properties, were substantially damaged during the storm.

7. TORNADO & WINDSTORMS

Tornadoes produce winds in excess of two hundred fifty miles per hour and can be a mile wide and travel for over fifty miles. Although this is not a common occurrence in the Borough of Bay Head, Ocean County is more susceptible to tornadoes than the northern communities of New Jersey. Strong winds caused by thunderstorms can exceed one hundred miles per hour and can cause as much damage as a tornado. High Winds are sustained winds of forty miles per hour or greater or winds gusting to fifty-eight miles per hour.

Environmental Impacts as a result of tornadoes and windstorms can be severe to vegetation and trees. There can be damage to structures and facilities containing hazardous material, utility interruptions and fires caused by breaking or rupturing utility connections and can cause transportation accidents.

8. WILDFIRE

Wildfires typically occur in unoccupied, rural or forested areas. Most wildfires happen during hot and dry seasons, but can occur at any time of the year. Fires are caused by both humans and natural causes.

Wildfires can range in size and intensity. Some wildfires are small and can be handled by the local firefighters. Larger wildfires may necessitate evacuation and require regional or national firefighting support.

Within the Borough of Bay Head there are very few wooded areas. Wildfires are very unlikely to occur in the Borough and therefore not an anticipated threat.

9. WINTER STORMS

Winter Storms are characterized by snow, sleet, freezing rain, or any mix of precipitation. A winter storm can last for several hours or continue for several days. Severe winter storms can result in transportation accidents, closing of roadways, stranded motorists, power outages, and depletion of oil heating supplies. Damage to vegetation and downed trees are common due to heavy snow loading, ice buildup, and/or high winds. When heavy snowfall and ice melt rapidly due to high temperatures, severe flooding may occur. Winter Storms can impact buildings, utilities and transportation systems. They can cause frostbite and loss of life. The older population is vulnerable mostly due to their physical condition and ability to have adequate heating. The Borough of Bay Head has a median age of 52 and 25% of the population are over 65 years of age. Auxiliary heat and power supplies such as wood burning stoves, kerosene heaters, and gasoline-power generators can help to reduce the vulnerability of humans to extreme cold temperatures.

10. HAZARDOUS MATERIALS & HOUSEHOLD HAZARDOUS WASTE

Hazardous material releases can occur at fixed sites on land and off shore, or during transport. Hazardous materials can include such things as toxic chemicals, flammable and combustible materials, compressed gases, explosive and blasting agents, radioactive materials, oxidizing materials, poisons and corrosive liquids. Most incidents with hazardous materials are accidental and unintentional. However, hazardous materials can be released intentionally by terrorist or criminal acts.

Hazardous material release can contaminate air, water, and soils. This can result in possible death or injury. Dispersion can take place rapidly when transported by water and wind. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

The Borough of Bay Head has no TRI (Toxics Release Inventory) facilities. In addition the surrounding communities of Point Pleasant, Point Pleasant Beach and Mantoloking also have no TRI facilities. None of the 1,238 total parcels within the Borough of Bay Head are located within 1.5 miles of a hazmat facility. Although there is always the possibility of off-shore hazardous material contamination, this hazard does not pose a major effect on the Borough of Bay Head.

The largest threat to the Borough of Bay Head from hazardous material contamination would be the threat from trucks transporting hazardous material through the Borough.

There are many common household products that pose a potential threat to families and to the Borough of Bay Head's clean air and water. There is a 2016 Ocean County Household Hazardous Waste Disposal Program sponsored by the Ocean County Board of Chosen Freeholders and the Ocean County Department of Solid Waste Management. This program allows residents of Ocean County to dispose of materials such as paints/thinners/boat paint, solvents, pool chemicals, pesticides and herbicides, aerosol cans, auto products, toilet and drain cleaners, silver polishes, oven cleaners, photographic chemicals, rug and upholstery cleaners, polishes and bleaches, waste oil and used gasoline. There are three locations for disposal and pre-registration is required.

- Stafford Township Public Works Garage – 609-978-0913
- Manchester Township Public Works Garage – 732-367-0802
- Toms River Township Public Works Garage – 732-506-5047

11. NUCLEAR INCIDENTS

Nuclear incidents involve the release of radioactive materials and/or exposure to radiation. After a nuclear incident, the main concern is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects such as death, cancer, burns, severe impairments and psychological effects. There are no nuclear power plants in the Borough of Bay Head, however in Forked River, Borough of Lacey, there is the Oyster Creek Nuclear Generating Station which is approximately 20 miles from the Borough of Bayhead. The plant has one operating license and is run by Exelon Generation Company.

To determine the risk factor, the Nuclear Regulatory Commission uses the Probabilistic Risk Assessments (PRA). PRAs typically focus on accidents that can severely damage the core and that may challenge containment. FEMA, PEMA and county governments have formulated Radiological Emergency response Plans that include a Plume Exposure Pathway Emergency Planning Zone (EPZ) with a radius of about ten miles from a nuclear power facility and an Ingestion Exposure Pathway EPZ with a radius of fifty miles from a nuclear facility.

The Borough of Bay Head is within the Ingestion Exposure Pathway EPZ fifty mile radius of Oyster Creek Nuclear Generating Station. Evacuation in case of a disaster is covered in the New Jersey State Police, Office of Emergency Management's Radiological Emergency Response Plan which is exercised twice annually.

Though no critical nuclear incidents have occurred at the Oyster Creek plant, in 1992 a large series of wildfires caused the plant to shut down as it continued to spread. No damage to the plant was incurred. In 2012, during Hurricane Sandy an alert due to the rising water level near the plant was declared.

The New Jersey Department of Environmental Protection (NJDEP) entered into an Administrative Consent Order with Exelon, the plant operator, on December 9, 2009 to close the Oyster Creek facility by December 31, 2019. A nuclear incident should be considered unlikely as defined by the Risk Factor Methodology until the decommissioning of Oyster Creek and after that point the risk factor would be eliminated.

12. URBAN FIRE AND EXPLOSION

Urban fire and explosions can cause localized or widespread damage depending on their size and intensity. Vehicles and/or structures are often the sites where fires ignite due to human mishaps and various fuel sources or flammable materials. Urban fires and explosions are often started by other hazards, namely severe storms, drought, transportation accidents, hazardous materials releases, or by criminal activity such as arson or terrorism.

One of the worst urban fire events in Ocean County occurred during Hurricane Sandy in the neighboring town of Mantoloking. Fires fueled by natural gas destroyed fourteen homes. The firefighters could not reach the fire to extinguish it at first, as the roads were blocked by debris and high water. During Hurricane Sandy, as many as twenty fires broke out in Ocean County. Most occurred in areas where water levels were high, due to the storm.

Urban fire and explosive events will occur in Ocean County. However, major fires or explosions will likely occur less frequently than minor fire incidents.

13. UTILITY INTERRUPTION

Utility interruptions and power failures are caused by equipment failure, accidents, and most often natural hazards. Windstorms and severe winter storms can cause major power

outages due to snow and wind that result in downed trees and wires. Supplies of potable water, electricity, and fuel at utility facilities can be compromised if flooding occurs.

Utility interruptions can lead to lack of water supply, food spoilage, loss of heating or air conditioning, basement flooding due to sump pump failure, lack of indoor lighting, and loss of communication services. This can be anywhere from a minor inconvenience to a serious hazard. The length of time that a utility is out of service determines the level of impact on residents and businesses. Significant power failures require emergency management to get involved and shelters to provide basic necessities to residents.

Jersey Central Power and Light has taken steps to reduce the vulnerability to utility interruptions. JCP&L operates a Vegetation Management Program to clear overgrown trees, shrubs and brush from power lines. JCP&L maintains a critical care list of customers who depend on electrically operated life support equipment. To be included on this list, every year customers must complete and submit an authorization form signed by their physician. The list is used to contact customers should an outage affect their electric service for more than 24 hours. JCP&L also has a list of homes and businesses that depend on electrically operated private wells for water. These lists are provided to the County's Office of Emergency Management.

14. CLIMATE CHANGE

Climate change can be considered a secondary hazard to many other hazards. Climate change can alter the frequency and intensity of hazards such as wildfire, extreme temperature, drought, or flooding. The biggest concern with climate change is its effect on sea level rise.

Sea level change can be effected by such things as surface and deep ocean circulation changes, storm surges, land movement, changes in runoff, etc. In general, a one foot rise in sea level would impact areas with an elevation of one foot. According to the NOAA

mapping for sea level rise. If the sea level were to rise to 3 feet, this would permanently inundate approximately 175 acres or forty percent (40%) of the Borough of Bay Head. Refer to Appendix B for the NOAA sea level rise mapping illustrating a 3 foot sea level rise. There are eight critical facilities within the Borough of Bay Head. Two of the critical facilities would be permanently inundated due to 1 ft of sea level rise and five of the critical facilities would be permanently inundated due to 3 ft of sea level rise. Refer to page 33 for a list of the critical facilities.

CHAPTER 6 - REPETITIVE LOSSES

The National Flood Insurance Program (NFIP) identifies properties that frequently experience flooding. Repetitive loss properties are structures insured under the NFIP that have had at least two paid flood losses of more than \$1,000 over any 10-year period since 1978. A property is considered a severe repetitive loss property either when there are at least four losses (each exceeding \$5,000) or when there are two or more losses where the building payments exceed the property value.

A summary of the NFIP policies, losses, and repetitive loss properties through March of 2016 indicated that in the Borough of Bay Head there were 721 policies in force, 827 claims since 1978 with a total payment of \$65,062,661.00, and forty repetitive loss properties and one severe repetitive loss property. A list of repetitive and severe repetitive loss properties was received from FEMA on 3/30/16. The location of the repetitive loss areas can be found on the Repetitive Loss Map located in Appendix B of this report.

Several of the houses within the repetitive loss area are in the process of being elevated, demolished with new elevated construction or demolished only. The repetitive loss list is determined by documented insurance claims to the National Flood Insurance Program. Properties that did not file claims or that do not maintain flood insurance cannot be documented. Refer to the Appendix for repetitive loss property areas.

CHAPTER 7 – HAZARD MITIGATION ACTION PLAN

The projects listed below were identified in the 2014 Ocean County Hazard Mitigation Plan and the status of those projects as of April 2017:

- Elevation of 165 homes to the new FEMA Advisory Base Flood Maps in the Borough of Bay Head. Currently 59 homes have been raised.
- Plan to elevate one building in Bay Head Borough. The new modular Police Department/Municipal Building was built and raised according to the flood regulations.
- Rebuild Police Head Quarter/ Municipal Building to minimize flood risk by re-location or mitigation in its present location. The municipal building has been constructed and is up and running. The design of the finished first floor was raised to an elevation above the required DFE (Design Flood Elevation) to account for additional freeboard for anticipated sea level rise in the future.
- Sea wall at the northern end of the Borough to be installed in front of 9 residential homes to reduce storm water flooding. The revetment has been completed by the private Homeowners Association which owns the beach.
- Continue to participate in the NFIP. The Borough continues to participate with the NFIP and provides clear information to the residents about the risks and promoting flood insurance.
- Continue to enforce building codes. The Borough continues to enforce building codes.
- Verbal Mutual Aid Agreement among Point Pleasant Beach, Point Pleasant, Bay Head, and Mantoloking. There is a verbal mutual aid agreement in place.
- USACE replenishment project and dune restoration. This project is anticipated to begin in the spring of 2017 through the Army Corp of Engineers.
- Maintain higher walkways over dunes to eliminate gaps in dune protection or install hurricane straps. The walkways are completed.
- Maintain fall dune grass planting. The Borough maintains on their website instructions for “Optimal Beach Grass Planting”. The Bay Head Environmental

Commission oversees the annual dune grass planting. The dune grass is provided annually by the Ocean County.

- Continue participation in CRS program; consider upgrading to the next class level. Currently the Borough is at a CRS rating of 6, providing a 20% discount for flood insurance policies within the flood plain. The Borough will continue to work towards upgrading to the next class level.
- Considering new alert system, such as Reverse 911. The Borough has implemented a system. It provides communication to the residents.
- Maintain Police Department Facebook Page. The Borough's Police Department maintains a Facebook Page to get information out to the public such as post events, notifications and provides valuable information regarding hazardous conditions and steps to take.
- Continue Police outreach programs in schools. The Police representative is at the school weekly to speak to the children regarding safety and other programs.
- Start quarterly emergency management town hall meetings. The Borough's OEM holds quarterly meetings and meets with staff when needed.
- Maintain Borough website; continue to update. The Borough Clerk as well as their webpage provider updates the website on a regular basis.

Additional Projects the Borough has identified are as follows with approximate cost estimates (see Appendix C):

- Road Intersections to be raised to reduce flood risks. The road intersections to be impacted are as follows:

➤ Lake Avenue & Johnson Street	\$135,246.80
➤ Lake Avenue & Forsythe Street	\$153,059.40
➤ West Lake Avenue & Cranberry Avenue	\$104,941.20
➤ West Lake Avenue & Park Avenue	\$150,319.00
➤ Bridge Avenue & Club Drive	\$150,319.00
➤ West Lake Avenue & Metcalfe Avenue	\$122,592.60
- Road raising to reduce flood risks. The roads to be impacted are as follows:

➤ Bridge Avenue – Priority to be raised	\$245,346.40
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- Club Drive – Priority to be raised \$425,245.60
 - Lake Avenue – From Harris Street to Osborne Avenue – Priority to be raised
\$864,838.00
 - Twilight Road – From Lake Avenue to Birch Place – Priority to be raised
\$360,282.00
 - Park Avenue – Already raised
 - Clayton Avenue – Currently being raised.
- Point Pleasant Pump Station Diversion. The Borough is in communication with Ocean County to divert the water that is currently being pumped into Twilight Lake to reduce flooding.
 - Install flood gates at Scow Ditch. Considerations for the installation of flood gates were reviewed to assess the feasibility to construct a complete flood mitigation project to mitigate flooding along Scow Ditch and Twilight Lake. In order for this method of flood mitigation to be effective against still water and tidal flooding it is necessary to tie into existing high ground to prevent flanking by flood water. Additionally flood gates could impede the natural tide cycle for the tidal wetlands located along Twilight Lake. Wetlands are strictly regulated by the NJDEP, therefore would not be permitted under the current NJDEP Land Use regulations.
 - Reduce tidal flooding at the Bay at the end of West Lake Avenue. The Borough will inspect the bulkheads for the possibility of replacement or raising.
In order to consider a floodwall or bulkhead to control flooding of the low lying areas along the bay, Scow Ditch and Twilight Lake, it would also require tying into existing high ground to prevent flanking by the flood water. For the Borough of Bay Head the main problem is the existing ground surface elevation along Route 35 at the Mantaloking border and Bridge Avenue. These areas would require deployable floodwalls to protect against stillwater rise which would be non-permanent since they would be located in the right of way of State, County and Local roads. Additionally the flood mitigation measure of bulkheading and deployable floodwalls would require pump stations and drainage improvements to address fluvial flooding conditions from storm water runoff. Based on the existing

topography of Bay Head, it was estimated that 12,750 linear feet of bulkhead and 750 linear feet of deployable floodwall would be required in order to protect from a flood storm event of elevation 5.0 ft (NAVD88). With a projected unit cost of construction of \$2,100/lf, the project cost for implementing a floodwall, deployable floodwall and drainage improvements is estimated to be \$28.3 million. To receive funding for the construction of a floodwall, the Borough would be required to demonstrate a positive benefit cost ratio. A detailed survey of all structures in the project area with existing first floor elevations would be required to determine if a positive benefit ratio is possible. As structures within the Borough continue to be raised, this would impact the benefit cost ratio. Therefore nonstructural measures including acquisition, building elevation and building dry proofing may be a more appropriate measure for flood mitigation.

- Installation of Tide Flex Valves to reduce street flooding. The Borough is currently installing two tide flex valves along West Lake Avenue.
- Bay Head Cheese Shop located at the corner of Bridge Avenue and Club Drive (91 Bridge Avenue). This property is located at a low point within the Borough. This low lying structure will restrict the Borough's ability to raise Bridge Avenue. Nonstructural measures can be considered to improve the building in order to allow for future road raising.
- Assessment of the Overall Storm Sewer. The Borough is currently examining a flooding problem at various areas.
- Implementation of more restrictive codes in anticipation of sea level rise.

Phase II projects recommended during the establishment of the “Strategic Recovery Planning Report” are as follows:

- Prepare, modify or replace neighborhood plans for local neighborhoods and specific areas in the Borough to develop flood mitigation strategies to protect the Borough from future flooding. These areas include:
 1. Beachfront - from East Avenue and eastward. This area experienced extensive damage during Super Storm Sandy.

-
2. Bayfront – This area experiences major tidal flooding.
 3. Twilight Lake & Scow Ditch Creek – This area experience floodwater surges causing floodwaters to overflow into the neighborhood.
- Preparation of the Borough’s Hazard Mitigation Plan to outline the Borough’s hazard risks and actions to be taken to mitigate these risks.
 - Preparation of the Borough’s Floodplain Management Plan to outline corrective and preventive measures to reduce the risk of current and future flooding.
 - Preparation of the Municipal Flood Resiliency Assessment to evaluate the Borough’s flood vulnerabilities and provide flood mitigation recommendations.
 - Updating the Master Plan to reflect the Borough’s current goals and objectives.
 - Updating the Design Standards and Zoning Regulations to reflect the recommendations that will be made during the reexamination of the Master Plan.
 - Incorporating the Green Building and Environmental Sustainability Plan Element into the Master Plan to promote the efficient use of the Borough’s natural resources.
 - Preparation of the Capital Improvement Plan to focus on flood management related projects.

The following are comments/suggestions expressed by the public during public meetings held while preparing the “Strategic Recovery Planning Report”:

- Consider Scow Ditch separately from Twilight Lake for analysis and mitigation purposes.
- Zoning regulations to increase setbacks for elevated houses.
- Creation of a Shade Tree Commission
- Creation of a Strategic Planning Committee to assist Council in long term strategic planning.
- Scow Ditch dredging project
- Expand the Neighborhood Plan studies to include all Special Flood Hazard Areas in the Borough.
- Coordinate Flood Mitigation ideas with the “Bay Head Preservation Alliance” which is a town-wide homeowners group.

-
- Consideration should be made to changing the pipe slope of the drainage pipe at Mount Street to avoid offgasing from stagnant water or relocate vent pipe.
 - Construction of a rock berm to address the Twilight Lake flood area.

CHAPTER 8 – HAZARD VULNERABILITY

The Borough plans on implementing the required activities necessary to meet the goals and objectives set forth for floodplain management. The following is a brief review of the activities proposed:

A. PREVENTION

As previously stated, the Borough of Bay Head, in addition to being governed by local zoning laws, building codes and a flood prevention ordinance, the Borough is also under the jurisdiction of the Coastal Area Facility Review Act (CAFRA). The entire municipality is in the CAFRA review area. CAFRA regulations do delineate maximum impervious cover and storm water management techniques to limit runoff from developing sites. CAFRA regulations do not include individual single family homes or construction that does not include CAFRA approval.

One existing zone, C Conservation Zone has been established in the Borough of Bay Head which has limited development. This area includes the railroad and Twilight Lake. This zone is made up entirely of lands which are in public ownership, most of which are severely constrained due to the presence of wetlands or open waters. The only development permitted in this zone is that which is necessary to support the existing public open space and transportation uses. No other development is permitted.

A revised Land Use Plan created the separation of the R-100 Single-Family Residential Bayfront Zone and the R-100 Single Family oceanfront Zone from the existing General R-100 Single-Family Residential Zone. This creates smaller lot coverage percentages to

preserve the neighborhood character and light, air, and space of the oceanfront, as well as to reduce problems with impervious coverage and storm water run-off issues.

Chapter 126, Flood Damage Prevention was implemented to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas through methods and by provisions designated to:

- Protect human life and health.
- Minimize expenditure of public money for costly flood control projects.
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
- Minimize prolonged business interruptions.
- Minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone and sewer lines, streets and bridges, located in areas of special flood hazards.
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.
- Ensure potential buyers are notified that property is in an area of special flood hazard.
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

Chapter 207, Stormwater Management was implemented to establish minimum stormwater management requirements and controls for major development, consistent with the statewide stormwater requirements at N.J.A.C. 7:8 and the provisions of the adopted Master Plan and Land Use ordinances. The goal of the regulations is to reduce flood damage, including damage to life and property. The regulations ensure the proper design of stormwater systems to mitigate against impacts from stormwater runoff, flooding, and pollution in environmentally sensitive areas.

B. OPEN SPACE PRESERVATION

The Borough is a small community with approximately 968 residents based on a 2010 census spread over 448 acres. The Borough is densely developed with limited open space. The entire length of the Borough along the ocean has open space beach frontage. Wetlands are present in the northwestern portion of the Borough. Emergent wetlands can be found to the northwest of Twilight Lake. These properties are within the Conservation Zone. Per the ordinance, “this zone is made up entirely of lands which are in public ownership, most of which are severely constrained due to the presence of wetlands or open waters. The only development permitted in this zone is that which is necessary to support the existing public open space and transportation uses. No other development is permitted.” There is 58.53 acres of wetlands, 41.09 acres of public open space/recreational areas, 41.52 acres of threatened and endangered habitat, 3.88 acres of riparian zone, and 82.26 acres of surface water.

The Borough of Bay Head Environmental Commission was established in 1989 for the protection, development or use of natural resources. One of the responsibilities of the commission, with the approval of the governing body, is to research and acquire properties in the name of the Borough of Bay Head. Currently there are three parks/wildlife sanctuaries in the Borough. Kellogg Memorial Island is an island within Twilight Lake which is a Wildlife Sanctuary. Evergreen Park which is located between Park Avenue and Evergreen Drive and the location of the old municipal sewer plant is a municipal park. Scow Ditch Park is a municipal park along Scow Ditch at the location of the old municipal building.

The Borough’s Master Plan Reexamination report in 2003 made recommendations to the Land Use Element to create two new land use districts that would prevent the excessive utilization of land. The Ordinance was revised per this recommendation as noted on page 24.

There are residential properties within the LiMWA limit line between East Avenue and the Atlantic Ocean. There are twelve properties on the repetitive loss list. There are residential properties as well as marinas within the LiMWA limit line between Clayton Avenue and the Bay, Lake Avenue and the Bay, and in the area of the Bay Head Yacht Club. There are no plans at this time to acquire additional lands as open space.

C. DUNE, ROCK WALL AND BEACH MAINTENANCE

Although there may be no long term defense for fixed oceanfront structures against a constantly rising ocean level, effective protection of the oceanfront and adjacent coastal areas in the intermediate term against high tides and flooding and against damage by the ocean under storm conditions requires sufficient elevation and breadth in the beach and dune areas to dissipate the force of the waves. The dunes should provide a continuous barrier and a source of sand to mitigate the effect of storm waves for the benefit of interior lands, as well as oceanfront premises and the recreational beach area. Beach erosion will be less damaging if the dune area is protected by sand fencing and the planting of dune grass. Accordingly, the Borough has a vital interest in the continued maintenance and protection of the beach and dune areas. Oceanfront homeowners are required to install snow fence and dune grasses that will help to build up the dunes. The Ocean County Board of Chosen Freeholders provides the Borough with some snow fence and dune grass plantings to distribute to the homeowners. There is assistance from civic groups and homeowners to plant dune grass at the beach ends.

The Borough adopted the Dune Protection Ordinance in accordance with the 2003 Master Plan Reexamination Report “to control development or disturbance of dunes thereby furthering shore protection efforts and preserving the dunes as an important environmental resource.

Article II, Protection of Beaches and Dunes.

As stated in Article II: “One of the purposes of this article is to achieve the maintenance of sand dunes at the highest practical height. To this end, no dune shall be directly or indirectly lowered or reduced in height by the action or inaction of any owner or his agent. If any dune, through natural causes, shall be or become lower than the elevation deemed materially significant by the Dune Consultant, applying recognized criteria, with due regard to the intent of this article and reasonable use of the premises, the owner thereof shall be obliged to install sand fences and plantings. The owner shall have an obligation to maintain and replace, if necessary, these fences and plantings, but shall not be obligated to take any other affirmative action, except as may be specified elsewhere in this article. If the dune is lowered or caused to be lowered by the direct or indirect action of any owner, then the dune shall, upon due notice to the owner, be restored as soon as reasonably possible to its preexisting elevation by the owner or at his expense. The restored dune shall be planted and sand fenced in accordance with specifications promulgated under this article.”

The ordinance maintains and protects the beach and dune areas as follows:

- Controlling and limiting construction east of the setback line of beachfront properties.
- Prohibiting people from being in a dune area.
- Prohibiting the removal, cutting, burning or destruction of natural vegetation, sand fence or such other types of dune protection devices in a dune area.
- Prohibiting the removal of sand from the beach or dune area.
- Requiring that sand which is transported upon lands by action of waves, tides, storms, etc. shall not be removed from the lot but instead be relocated eastwardly and restored to the beach and dune areas.
- Ordinance Section 75-7G(2)(a-e) Limits walkways across the dune area to one for each residence. The walkway must not exceed 4 feet in width and take the shortest possible course between the residence and the seaward edge of the dune.

Providing 16% open space in walkway to allow for the dune grass to grow underneath.

- Encourage construction of elevated walkways over the crest of the dune.
- Maintaining an acceptable dune height of 16 feet elevation above sea level.
- Setting into place penalties for not maintaining dunes.
- Restricting the size of newly constructed dune platforms within the dune area to 200 square feet.
- Requiring that a permit be obtained prior to any dune mechanical replenishment activities.
- Requiring that the owners of dune properties, plant or cause to be planted suitable vegetation and erect suitable sand fencing.
- Strictly limiting motor vehicles and people on dune areas.

In 1882 the Borough constructed a 4,134 ft stone rubble seawall which had been buried by dunes. This wall played a role in reducing damage to the Borough during Hurricane Sandy.

In 2014 the Private beach owners started the construction of a 1,500 foot long rock wall at the North end of the Borough to attach to the rock wall that was constructed in 1962 in the middle section of the oceanfront after a destructive storm hit. The rock wall construction is complete and the entire oceanfront is lined with boulders. The rock wall is maintained by the Private beach owners.

The USACE has plans to build protective sand dunes along the state's entire 127-mile coastline. The project is anticipated to begin in the spring of 2017.

The Borough has constructed higher walkways over dunes to eliminate gaps in dune protection.

The Borough maintains fall dune grass planting. The Bay Head Environmental Commission along with the Public Works Department oversees the annual dune grass planting. The dune grass is provided annually by the Ocean County.

D. BUILDING ELEVATION

Raising low buildings was considered to be the best option for reducing flood damage to susceptible properties. If a property sustains over 25% damage twice within 10 years and considered a repetitive loss property, then the structure may be eligible to receive funding to be raised through grant programs available through the State. The Flood Damage Prevention Chapter 126 Ordinance Section 126-5 defines Substantial Damage as damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.

Although many homeowners are not favorable towards elevating their houses due to the costs involved, many people choose to raise their homes when there is a greater availability of financial support. State-wide grant programs and increasing awareness of ICC funding has led to greater numbers of homeowners choosing to raise their homes over the past couple years. In June 1997, the National Flood Insurance Program offered additional coverage called “Increase Cost of Compliance” or ICC. People covered by flood insurance whereby people are offered additional funds for complying with the local Floodplain Management Ordinance.

The Flood Damage Prevention Ordinance indicates that the best available and most current data released by FEMA shall take precedence over previous panels and FIS in construction and development regulations only. Where the Special Flood Hazard Area (SFHA) and the Flood Hazard Area (FHA) Maps conflict or overlap, whichever imposes the more stringent requirement shall prevail when determining the flood elevation. The Ordinance further stipulates that new construction and substantial improvement of any residential structure shall have the lowest floor, including basement together with the

attendant utilities and sanitary facilities, elevated above the base flood elevation plus one (1) foot of freeboard.

In March of 2016, DCA updated the building code that requires any building within a coastal A zone be constructed in accordance with V zone construction standards. The coastal A zone is an area which lies between the V zone and AE zone from the LiMWA line (The Limit of Moderate Wave Action) towards the water's edge.

E. BULKHEADING

Currently the Borough does not have a bulkhead ordinance in place. However, the Borough's Public Works Department continues to inspect, maintain and replace the Municipality's bulkheads located at road ends within the Borough. The Borough is in the process of inspecting the bulkheads at the Bay Head Yacht Club to determine the possibility of replacing or raising as necessary to reduce tidal flooding in that area.

The private bulkheads are regulated through the New Jersey Department of Environmental Protection. The property owner is required to obtain a permit for any new construction or replacement of an existing bulkhead. The property owner is responsible for the maintenance and repair of a bulkhead located on their property.

F. FLOOD PROOFING

Because of the many shallow drainage inlets connected to the lagoons and back bay areas of the bayfront and due to the predominantly small lot size, levees and floodwalls are not considered feasible methods of protection. Most residential flood prone houses within the Borough are of frame design with an open crawl space making flood proofing a difficult operation. Dry flood proofing is most applicable to commercial structures which already have a substantial structural design.

Wet flood proofing is currently recommended where a commercial building is below the Base Flood Elevation and cannot be raised. This could involve permanently elevating fixtures and furniture. Flood water resistant materials should be used whenever possible in these areas.

G. EMERGENCY SERVICES

Emergency Services are for protection during and after a flood. This is covered under the Borough Emergency Operations Plan under the Emergency Management Council. Presently this plan is approved by both the County and State Offices of Emergency Management. This plan currently covers warning, response, recovery, and critical care facilities.

The Borough's Police Department maintains a website that is updated daily and informs the residents in the case of an emergency and instructs residents the procedures to follow. During a hazardous event, the Police will go door to door with a PA system alerting residents to evacuate. There are two Evacuation Routes. The primary route is along Main Street (Route 35) to Bridge Avenue to Route 70. The alternate route is Main Street (Route 35) north into Point Pleasant Beach.

The Borough's Emergency Management website instructs residents to visit the Ocean County Sheriff's Department (www.co.ocean.nj.us/sheiff or call 800-331-8152) for further instructions regarding what to do in the event of an emergency. The Ocean County Sheriff's office website provides real time alerts, instructions and preparedness information. The Borough's evacuation routes are based on the Ocean County Evacuation Routes Plan which is located on the Borough's website under Emergency Management Storms & Hurricanes tab. The website also provides a list of radio stations and a cable channel that residents should tune into in the event of an emergency.

H. CRITICAL FACILITIES PROTECTION

In Borough of Bay Head there are 1,238 parcels. In the Special Flood Hazard Area which has a 1% annual chance of flooding there are 1,138 parcels and 5 critical facilities. This is 91.92% of the overall number of parcels in the Borough. The estimated value of the structures within the Special Flood Hazard Area is \$566,926,100. Five critical facilities are within the SFHA. The critical facilities within Borough of Bay Head are discussed below. Refer to the Appendix for mapping:

- 1) The Borough's 5 critical facilities are as follows:
 - a) Borough Hall
 - b) School
 - c) Police Department
 - d) Fire Department
 - e) Bay Head Lift Station (Sanitary Sewer)

The Borough Emergency Operations Center, Police, Fire Department and Garage are located at the northern end of town. The Borough Hall, Police Station and Fire Station were all impacted during Superstorm Sandy. The construction of the municipal building is complete. The design of the finished first floor was raised to an elevation above the required Design Flood Elevation (DFE) to account for additional freeboard for anticipated sea level rise in the future.

The Borough's wastewater is collected through the Borough's lines, which then connect to the OCUA system. An OCUA interceptor originates at the Bay Head Lift Station (NPS-7) just south of Twilight Lake. The lift station is above the 500 year storm elevation. The Borough school is located within close proximity to the Bay Head Harbor. The school suffered significant damage during Super Storm Sandy. The first floor of the school was flooded during the storm, and a week later a water pipe broke in the school causing even more damage.

The School located in the Borough of Bay Head is as follows:

1. Bay Head Elementary School
Grades K through 8th
145 Grove Street
Bay Head, NJ 08742

I. STORMWATER CHECK VALVES

The viability of various structural measures was reviewed. Given the tidal flooding which is the main cause of repetitive loss within Borough of Bay Head, and the intricate nature of its coastline, most structural projects are not feasible.

Due to the low elevations of many of the streets adjacent to tidal waters, the roads often become inundated with water during many high tide events. To combat this, the Borough has begun utilizing tide flex valves in their drainage lines prior to discharge into the tidal water bodies. These valves will reduce the frequency that the roadways will experience flooding preventing traffic from utilizing these roads.

In addition to the tide flex valves, the Borough has been raising the elevation at the roadways adjacent to these tidal water bodies during road reconstruction projects. The existing houses, driveways and sidewalks limit the amount each of these roads can be raised.

J. BEACH NOURISHMENT AND DREDGING

To provide the necessary shoreline protection the USACE has selected a beach nourishment plan that includes construction of an approximately 75 to 100 foot wide berm and dune system along the entire 13.7 mile length. The major portion of the project is from Island Beach State Park to Borough of Bay Head which consists of low-lying flat

barrier beaches interspersed with dune fields. The proposed berm would be periodically re-nourished for the life of the project (i.e., 50 years). Sandy material dredged from two offshore borrow sites would be used for the initial beach nourishment as well as subsequent re-nourishment cycles.

The Twilight Lake dredging and restoration project was completed in 2015 by the USACE through various funding sources.

K. DRAINAGE IMPROVEMENTS

The Borough is assessing the overall storm sewer system within the Borough. The Borough is examining flooding problems throughout the town including along the south side of Osborne Avenue adjacent to the railroad. At least 20 homes in this area have been affected.

CHAPTER 9 – CAPABILITY ASSESSMENT

An evaluation was performed to determine the planning, regulatory, administrative, technical, financial, and education and outreach capabilities present in the Borough of Bay Head.

A. PLANNING CAPABILITY

The Borough of Bay Head has in place or is in the process of developing the following plans:

- Comprehensive Master Plan
- Strategic Recovery Planning Report
- Complete Streets Bicycle and Pedestrian Plan
- Economic Development Plan
- Local Emergency Operation Plan (EOP)

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- Storm Water Management Plan
 - Municipal Public Access Plan
 - Bayfront Neighborhood Plan
 - Twilight Lake Neighborhood Plan

B. BUILDING CODE AND ORDINANCE CAPABILITY

The Borough of Bay Head has in place and continues to update and perfect the following codes, regulations and ordinances:

- Building Code
- Site Plan Review
- Zoning Ordinances
- Subdivision Ordinance
- Floodplain Ordinance
- Beach & Dune Protection Ordinance
- Parks and Wildlife Sanctuaries Ordinance
- Stormwater Management Ordinance
- Flood Insurance Rate Map

C. CRS PARTICIPATION

The Borough of Bay Head entered the program on October 1, 1993 and was effective October 1, 1998. Currently the Borough of Bay Head is at a Class 6 rating. The Borough has a total of 2,232 points which allows for a 20% discount for the SFHA and 10% for non-SFHA on flood insurance. Additional points will be sought after to achieve a higher rating which includes the preparation of this plan.

The Borough has completed its last cycle in 2014 and will be required to cycle again in 2019. The following is the schedule for recertification and cycling.

- 2016 – Recertification

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- 2017 – Recertification
 - 2018 – Recertification
 - 2019 - Cycle

D. ADMINISTRATIVE CAPABILITY

Borough of Bay Head has the following administrative capability to assist in implementing mitigation related activities:

- Planning Board
- Maintenance programs to reduce risk
- Mutual aid agreements

E. STAFFING CAPABILITY

Borough of Bay Head has the following staffing capability to assist in implementing mitigation related activities:

- Part-time Building Code Official
- Part-time Floodplain Manager
- Two Full-time Emergency Management Personnel
- Community Planning Consultant
- Civil Engineer Consultant

F. TECHNICAL CAPABILITY

Borough of Bay Head has the following technical in-house capability in place to assist with Mitigation:

- Warning systems and services

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- Maintaining hazard data information
 - Grant writing

Outside assistance in hazard mitigation include New Jersey Association for Floodplain Management, NJDEP, NJ Department of Community Affairs, the Jacques Cousteau Institute for Estuarine Research, Stockton College, Army Corps of Engineers, Department of Housing and Urban Development, Department of Agriculture, Economic Development Administration, Emergency Management Institute, Environmental Protection Agency and FEMA.

G. FISCAL CAPABILITY

The Borough of Bay Head relies on the following resources to implement mitigation related activities that are shown in this plan:

- Capital Improvement Project
- Community Development Block Grant
- Hazard Mitigation Grant Program
- New Jersey Emergency Management Grant
- Other federal and State funding programs

H. EDUCATION AND OUTREACH CAPABILITY

The Borough of Bay Head has the following outreach and public education programs in place:

- The Borough sends out a letter to the community each year which addresses issues such as flood information, flood insurance, storms and flooding, homeowner's responsibility, stormwater pollution, reminders and changes of the Borough Code.
- The police will on occasion go door to door handing out informational pamphlets to the residents with regard to hazard conditions and preparedness.

CHAPTER 10 – MITIGATION STRATEGY

Borough of Bay Head has goals and objectives to implement various long term and short term mitigation projects. The Borough took into consideration the hazard risks faced by the Borough and developed a mitigation strategy to address those risks.

The matrices in Appendix A provide the recommended projects for Mitigation and Resiliency for the Borough of Bay Head. The Mitigation projects in Appendix A are those recommended in the Ocean County Hazard Mitigation Plan.

Additional projects were identified by the Borough and the public during the strategic recovery planning process. Mitigation projects such as the construction of dunes, elevations of roads, bridges, utilities and buildings, or improvements to stormwater management facilities. Also planning activities for resiliency to increase preparedness and protection against storm events were discussed. Vulnerable properties and facilities, particularly for facilities where elevation above the flood elevation is not feasible need to be examined.

N:\SECRETAR\1503 - BAY HEAD\T017\1503T017 Hazard Mitigation Plan (2015).docx

APPENDIX A

BOROUGH OF BAY HEAD'S MUNICIPAL ACTION PLAN PROGRESS WORKSHEETS

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.26-1 Elevate 165 Homes	
Responsible agency	Borough of Bay Head	
Contact information	Name:Sue Brasefield	Phone:732-383-1950
	Email: sbrasefield@maserconsulting.com	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: 59 homes raised	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-2 Elevation of one building	
Responsible agency	Borough of Bay Head	
Contact information	Name: Brian Magory	Phone: 732-892-0636
	Email: bmagory@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Completed	
	Summary description: New modular Police Department/Municipal Building built and raised according to flood regulations.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-3 Rebuild Municipal Building & Police Headquarters	
Responsible agency	Borough of Bay Head	
Contact information	Name: Brian Magory	Phone: 732-892-0636
	Email: bmagory@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: Building built, Police and Municipal Offices up and running.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-5 Continue NFIP	
Responsible agency	Borough of Bay Head	
Contact information	Name: Patricia Applegate	Phone: 732-892-0636
	Email: papplegate@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: The Borough continues to participate in NFIP	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-6 Continue enforcement of building codes	
Responsible agency	Borough of Bay Head	
Contact information	Name: Douglas Applegate	Phone: 732-892-0636
	Email: dapplegate@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: Borough continues to enforce building codes	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-7 Establish Mutual Aid Agreement w/Pt. Beach, Pt. Pleasant beach & Mantoloking	
Responsible agency	Borough of Bay Head	
Contact information	Name: Robert Hoffman	Phone: 732-892-0632
	Email: rhoffman@bayheadpolice.org	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: Mutual Agreement	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-10 Maintain Dune Grass Program	
Responsible agency	Borough of Bay Head	
Contact information	Name: Charles Tillson	Phone: 732-892-6792
	Email: ctillson@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: Dune grass planted every year on Borough property.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-11 Continue CRS	
Responsible agency	Borough of Bay Head	
Contact information	Name: Sue Brasefield	Phone: 732-383-1950
	Email: sbrasefield@maserconsulting.com	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): ongoing	
	Summary description: Continue participating in the CRS program.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-12 Establish Alert System	
Responsible agency	Borough of Bay Head	
Contact information	Name: Jennifer Barnes	Phone: 732-892-0636
	Email: jbarnes@rocketmail.com	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Completed	
	Summary description: Communication to residents that are not here all year round.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-13 Maintain Police Department Facebook Page	
Responsible agency	Borough of Bay Head	
Contact information	Name: Kelley Jean Mickle	Phone: 732-892-0588
	Email: kmickle@bayheadpolice.org	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Completed	
	Summary description: Post important events, notifications etc. to get out to the public.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-14 Continue Police Outreach Program in the Schools	
Responsible agency	Borough of Bay Head	
Contact information	Name: Zachary Keller	Phone: 732-892-0588
	Email: zkeller@bayheadpolice.org	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Ongoing	
	Summary description: Go into the school weekly to speak with the children regarding safety and other programs.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

Appendix H – Monitoring, Evaluating and Updating Tools

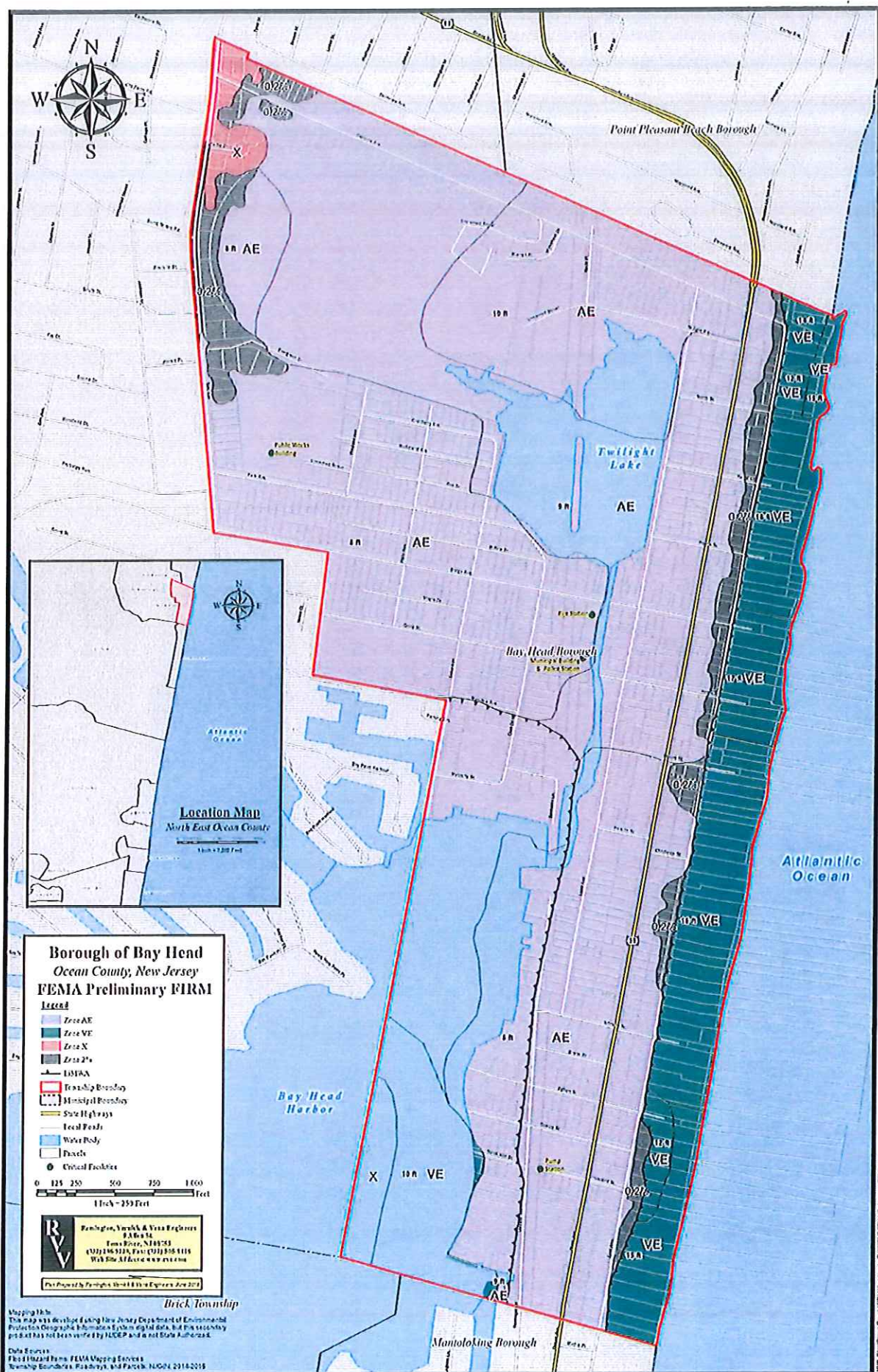
Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-15 Hold Quarterly OEM/Town Hall Meetings	
Responsible agency	Borough of Bay Head OEM	
Contact information	Name: Kelley Jean Mickle	Phone: 732-892-0588
	Email: kmickle@bayheadpolice.org	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Ongoing	
	Summary description: Hold quarterly OEM Meetings, meet with staff when needed.	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

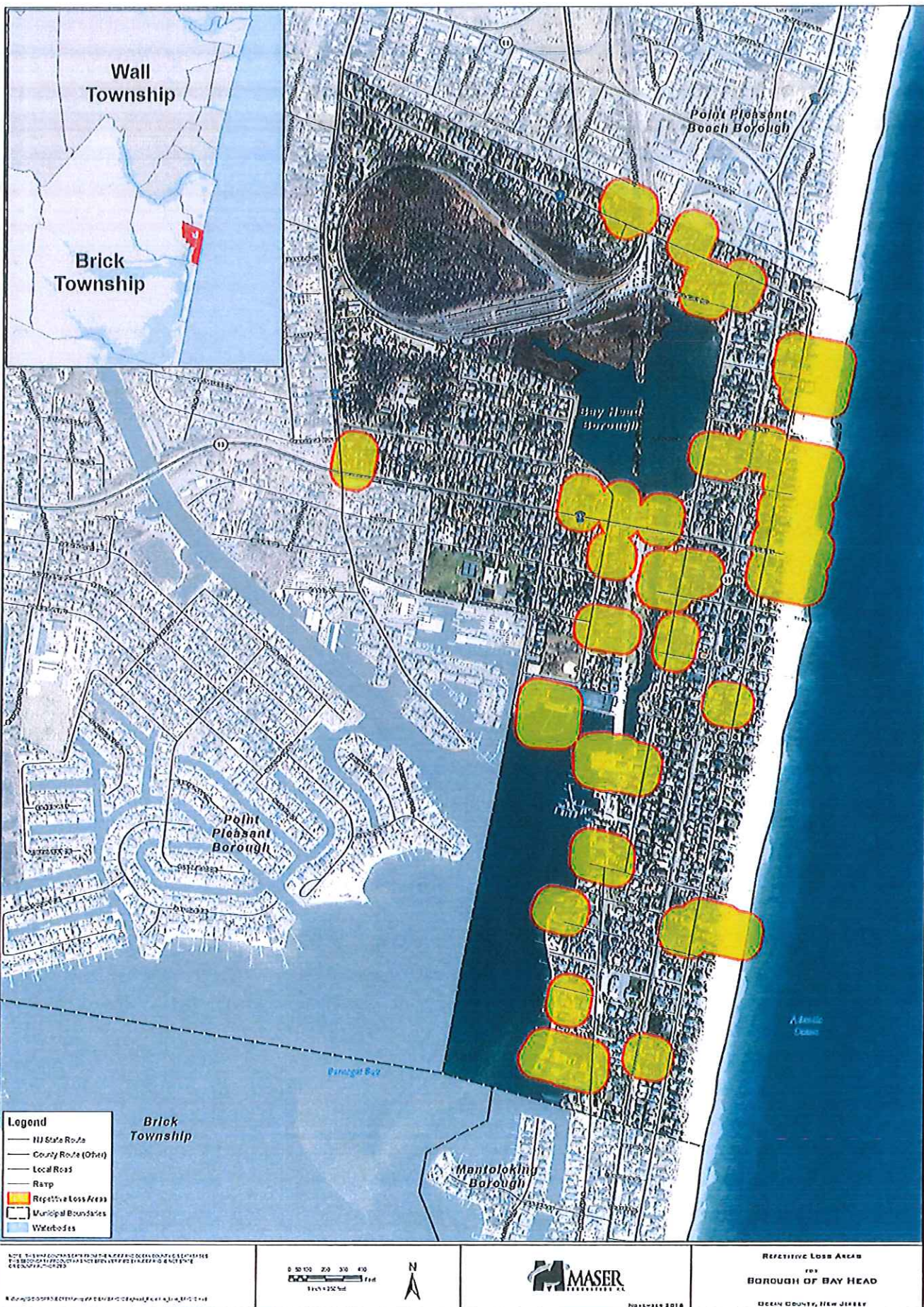
Appendix H – Monitoring, Evaluating and Updating Tools

Action Progress Worksheet		
Report period	From: May 1, 2016	To: April 1, 2017
Action title	6.4.3-16 Maintain Borough Website	
Responsible agency	Borough of Bay Head	
Contact information	Name: Patricia Applegate	Phone: 732-892-0636
	Email: papplegate@bayheadnj.us	
Action Progress [Including integration into existing planning mechanisms]	Status (completed, withdrawn, deferred, ongoing or new): Ongoing	
	Summary description: Update and Maintain Borough website	
1. What was accomplished for this action during this reporting period?		
2. What obstacles, problems, or delays were encountered?		
3. If not completed, is the action still relevant? Should the action and/or the anticipated completion date be revised?		
4. Other comments		

APPENDIX B

MAPPING







<h2 style="margin: 0;">3 FOOT SEA LEVEL RISE INUNDATION MAP</h2>			
<h3 style="margin: 0;">SEA LEVEL RISE AND COASTAL FLOODING IMPACTS</h3>			
BOROUGH OF BAY HEAD		OCEAN COUNTY	
NEW JERSEY			

REVISIONS

REV.	DATE	DESCRIPTION	BY
1	4-6-17	Initial	PH

DATE: 4-6-17
SCALE: 1" = 100'

**REMINGTON, VERNICK
& VENA ENGINEERS**
9 ALLEN STREET
TOMS RIVER, N.J. 08753
(732) 296-6220, FAX (732) 296-6416
WEB SITE ADDRESS: WWW.RVVE.COM
Certification of Authority: NJ CA 2000000
-2016-2020 EXCELLENCE SINCE 1991-

APPENDIX C

COST ESTIMATES

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Lake Avenue & Johnson Street Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	550	SY	Roadway Excavation	\$3.00	\$1,650.00
3	300	CY	Structural Fill	\$25.00	\$7,500.00
4	550	SY	6" Thick Dense Graded Aggregate	\$25.00	\$13,750.00
5	90	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$10,800.00
6	60	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$7,200.00
7	1	LS	Drainage Improvements (30% of Cost)	\$25,170.00	\$25,170.00
8	300	LF	Concrete Curb & Gutter	\$30.00	\$9,000.00
9	120	SY	4" Concrete Sidewalk	\$40.00	\$4,800.00
10	20	SY	Reinforced Concrete Driveway Apron	\$60.00	\$1,200.00
11	2	UN	Detectable Warning Surfaces	\$500.00	\$1,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total \$109,070.00

Inspection (15%) \$16,360.50

Design, Bidding and Contract Admin. (9%) \$9,816.30

TOTAL \$135,246.80

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Lake Avenue & Forsythe Street Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	650	SY	Roadway Excavation	\$3.00	\$1,950.00
3	350	CY	Structural Fill	\$25.00	\$8,750.00
4	650	SY	6" Thick Dense Graded Aggregate	\$25.00	\$16,250.00
5	100	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$12,000.00
6	70	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$8,400.00
7	1	LS	Drainage Improvements (30% of Cost)	\$28,485.00	\$28,485.00
8	400	LF	Concrete Curb & Gutter	\$30.00	\$12,000.00
9	120	SY	4" Concrete Sidewalk	\$40.00	\$4,800.00
10	30	SY	Reinforced Concrete Driveway Apron	\$60.00	\$1,800.00
11	4	UN	Detectable Warning Surfaces	\$500.00	\$2,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total	\$123,435.00
Inspection (15%)	\$18,515.25
Design, Bidding and Contract Admin. (9%)	\$11,109.15
TOTAL	\$153,059.40

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

West Lake Avenue & Cranberry Avenue Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey

4/6/2017

Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	400	SY	Roadway Excavation	\$3.00	\$1,200.00
3	200	CY	Structural Fill	\$25.00	\$5,000.00
4	400	SY	6" Thick Dense Graded Aggregate	\$25.00	\$10,000.00
5	65	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$7,800.00
6	40	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$4,800.00
7	1	LS	Drainage Improvements (30% of Cost)	\$19,530.00	\$19,530.00
8	250	LF	Concrete Curb & Gutter	\$30.00	\$7,500.00
9	0	SY	4" Concrete Sidewalk	\$40.00	\$0.00
10	30	SY	Reinforced Concrete Driveway Apron	\$60.00	\$1,800.00
11	0	UN	Detectable Warning Surfaces	\$500.00	\$0.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total \$84,630.00

Inspection (15%) \$12,694.50

Design, Bidding and Contract Admin. (9%) \$7,616.70

TOTAL \$104,941.20

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

West Lake Avenue & Park Avenue Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	650	SY	Roadway Excavation	\$3.00	\$1,950.00
3	350	CY	Structural Fill	\$25.00	\$8,750.00
4	650	SY	6" Thick Dense Graded Aggregate	\$25.00	\$16,250.00
5	100	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$12,000.00
6	70	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$8,400.00
7	1	LS	Drainage Improvements (30% of Cost)	\$27,975.00	\$27,975.00
8	400	LF	Concrete Curb & Gutter	\$30.00	\$12,000.00
9	100	SY	4" Concrete Sidewalk	\$40.00	\$4,000.00
10	15	SY	Reinforced Concrete Driveway Apron	\$60.00	\$900.00
11	4	UN	Detectable Warning Surfaces	\$500.00	\$2,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total \$121,225.00

Inspection (15%) \$18,183.75

Design, Bidding and Contract Admin. (9%) \$10,910.25

TOTAL \$150,319.00

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Bridge Ave & Club Drive Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	650	SY	Roadway Excavation	\$3.00	\$1,950.00
3	350	CY	Structural Fill	\$25.00	\$8,750.00
4	650	SY	6" Thick Dense Graded Aggregate	\$25.00	\$16,250.00
5	100	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$12,000.00
6	70	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$8,400.00
7	1	LS	Drainage Improvements (30% of Cost)	\$27,975.00	\$27,975.00
8	400	LF	Concrete Curb & Gutter	\$30.00	\$12,000.00
9	100	SY	4" Concrete Sidewalk	\$40.00	\$4,000.00
10	16	SY	Reinforced Concrete Driveway Apron	\$60.00	\$900.00
11	4	UN	Detectable Warning Surfaces	\$500.00	\$2,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total	\$121,225.00
Inspection (15%)	\$18,183.75
Design, Bidding and Contract Admin. (9%)	\$10,910.25
TOTAL	\$150,319.00

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

West Lake Ave & Metcalfe Ave Intersection
Raising

Borough of Bay Head
Ocean County, New Jersey

4/6/2017

Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	500	SY	Roadway Excavation	\$3.00	\$1,500.00
3	250	CY	Structural Fill	\$25.00	\$6,250.00
4	500	SY	6" Thick Dense Graded Aggregate	\$25.00	\$12,500.00
5	80	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$9,600.00
6	50	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$6,000.00
7	1	LS	Drainage Improvements (30% of Cost)	\$22,815.00	\$22,815.00
8	250	LF	Concrete Curb & Gutter	\$30.00	\$7,500.00
9	80	SY	4" Concrete Sidewalk	\$40.00	\$3,200.00
10	25	SY	Reinforced Concrete Driveway Apron	\$60.00	\$1,500.00
11	2	UN	Detectable Warning Surfaces	\$500.00	\$1,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total \$98,865.00

Inspection (15%) \$14,829.75

Design, Bidding and Contract Admin. (9%) \$8,897.85

TOTAL \$122,592.60

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Twilight Road
From Lake Avenue to Birch Street
Road Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	2,100	SY	Roadway Excavation	\$3.00	\$6,300.00
3	1,000	CY	Structural Fill	\$25.00	\$25,000.00
4	2,100	SY	6" Thick Dense Graded Aggregate	\$25.00	\$52,500.00
5	310	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$37,200.00
6	200	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$24,000.00
7	1	LS	Drainage Improvements (30% of Cost)	\$67,050.00	\$67,050.00
8	1,250	LF	Concrete Curb & Gutter	\$30.00	\$37,500.00
9	160	SY	4" Concrete Sidewalk	\$40.00	\$6,400.00
10	110	SY	Reinforced Concrete Driveway Apron	\$60.00	\$6,600.00
11	2	UN	Detectable Warning Surfaces	\$500.00	\$1,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00
Total					\$290,550.00
Inspection (15%)					\$43,582.50
Design, Bldg and Contract Admin. (9%)					\$26,149.50
TOTAL					\$360,282.00

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Lake Avenue
From Harris Street to Osborne Ave
Road Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	5,500	SY	Roadway Excavation	\$3.00	\$16,500.00
3	2,500	CY	Structural Fill	\$25.00	\$62,500.00
4	5,500	SY	6" Thick Dense Graded Aggregate	\$25.00	\$137,500.00
5	800	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$96,000.00
6	475	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$57,000.00
7	1	LS	Drainage Improvements (30% of Cost)	\$160,950.00	\$160,950.00
8	3,200	LF	Concrete Curb & Gutter	\$30.00	\$96,000.00
9	750	SY	4" Concrete Sidewalk	\$40.00	\$30,000.00
10	150	SY	Reinforced Concrete Driveway Apron	\$60.00	\$9,000.00
11	10	UN	Detectable Warning Surfaces	\$500.00	\$5,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00
Total					\$697,450.00
Inspection (15%)					\$104,617.50
Design, Bidding and Contract Admin. (9%)					\$62,770.50
TOTAL					\$864,838.00

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Bridge Ave
East of Rt 35
Road Raising

Borough of Bay Head
Ocean County, New Jersey
4/6/2017
Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	1,200	SY	Roadway Excavation	\$3.00	\$3,600.00
3	600	CY	Structural Fill	\$25.00	\$15,000.00
4	1,200	SY	6" Thick Dense Graded Aggregate	\$25.00	\$30,000.00
5	200	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$24,000.00
6	110	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$13,200.00
7	1	LS	Drainage Improvements (30% of Cost)	\$45,660.00	\$45,660.00
8	700	LF	Concrete Curb & Gutter	\$30.00	\$21,000.00
9	350	SY	4" Concrete Sidewalk	\$40.00	\$14,000.00
10	40	SY	Reinforced Concrete Driveway Apron	\$60.00	\$2,400.00
11	4	UN	Detectable Warning Surfaces	\$500.00	\$2,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total	\$197,860.00
Inspection (15%)	\$29,679.00
Design, Bidding and Contract Admin. (9%)	\$17,807.40
TOTAL	\$245,346.40

REMINGTON, VERNICK & VENA ENGINEERS

Engineers Cost Estimate

Club Drive
From Bridge Avenue to West Lake Avenue
Road Raising

Borough of Bay Head
Ocean County, New Jersey

4/6/2017

Our File: 1503-T-019

Base Bid

ITEM	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT	AMOUNT
1	1	LS	Site Clearing and Mobilization	\$15,000.00	\$15,000.00
2	2,200	SY	Roadway Excavation	\$3.00	\$6,600.00
3	1,100	CY	Structural Fill	\$25.00	\$27,500.00
4	2,200	SY	6" Thick Dense Graded Aggregate	\$25.00	\$55,000.00
5	330	Ton	2 1/2" Thick 12.5M64 HMA Base Course	\$120.00	\$39,600.00
6	190	Ton	1 1/2" Thick 9.5M64 HMA Surface Course	\$120.00	\$22,800.00
7	1	LS	Drainage Improvements (30% of Cost)	\$79,140.00	\$79,140.00
8	1,350	LF	Concrete Curb & Gutter	\$30.00	\$40,500.00
9	950	SY	4" Concrete Sidewalk	\$40.00	\$38,000.00
10	80	SY	Reinforced Concrete Driveway Apron	\$60.00	\$4,800.00
11	4	UN	Detectable Warning Surfaces	\$500.00	\$2,000.00
12	1	LS	Traffic Control	\$2,000.00	\$2,000.00
13	1	LS	Site Restoration	\$10,000.00	\$10,000.00

Total \$342,940.00

Inspection (15%) \$51,441.00

Design, Bidding and Contract Admin. (9%) \$30,864.60

TOTAL \$425,245.60