

BOROUGH WIDE STORMWATER MASTER PLAN

INTRODUCTION

The Borough of Keansburg is located adjacent to the Sandy Hook Bay and the Raritan Bay, and is bounded on the west by Waackaack Creek, State Highway Route 36 on the south, and Middletown Township to the east. The Borough consists of approximately 1.0 square mile of which 450 acres (0.7 square mile) drain to the Raritan/Sandy Hook Bay via six (6) existing drainage outfall pipes as outlined in red on the attached drainage map. The remaining area (0.3 square mile) drains to Waackaack Creek via various storm inlets and piping to a series of small outlet pipes as outlined in blue on the attached drainage area map.

EXISTING CONDITIONS

Topography throughout the Borough is generally flat with a slight variation in grade. A majority of the roadway grades are flat with poor surface (gutter flow) drainage. The existing drainage systems throughout the Borough are generally undersized and/or deteriorated. Where new drainage systems have been installed they are generally connected to existing deteriorated systems which do not have the capacity to convey required flow. In some instances the new systems were improperly installed which further exacerbates the flooding conditions. All of these conditions contribute to the persistent Borough wide flooding.

The existing flooding conditions are further aggravated by tidal action. During periods of high tide and/or tidal surge due to coastal storms, portions of the existing drainage systems become submerged reducing flow carrying capacity of the drainage system which prevents the conveyance of stormwater from the interior collection systems.

The six (6) drainage outfalls into the Raritan Bay and Sandy Hook Bay were built in the late 1960s as part of Army Corp of Engineers (ACOE), Raritan Bay and Sandy Hook Bay Beach Erosion and Hurricane project. The Borough constructed an additional outfall at Twilight Avenue in 1989. The original outfalls built as part of the Corps project are presently in poor condition and do not function. In many cases, the existing outfall chamber, flap valve and sluice gates are not operable,

which allows tidal waters to back flow into the interior stormwater collection systems and inundate the Borough streets.

The Borough recently completed the installation of two (2) stormwater pump stations. The first pump station is located at the end of Raritan Avenue and has a tributary area of approximately 140 acres. The second pump station is located at the end of Beacon Light Avenue having a tributary area of approximately 135 acres. These pump stations were designed to pump stormwater runoff from the upstream tributary areas during periods of high tide reducing the potential for localized street flooding within their tributary area. In addition to the new pump stations, the New Jersey Department of Environmental Protection (NJDEP) recently awarded a construction contract to replace five (5) of the existing stormwater outfalls and chambers. The project involves the replacement of the outfall chamber, flap valve, sluice gate, and outfall pipe into the Raritan/Sandy Hook Bay. The project does not include replacement and/or installation of drainage pipe landward of the new outfall chamber. In order for the new pump stations and outfall structures to have an impact on flooding within the Borough, the Borough must construct the necessary drainage piping landward of the new outfall chambers to provide a positive connection from the upstream tributary areas to the new outfall pipe.

RECOMMENDATIONS

In order for the new pump stations with the new outfalls to have a significant impact on flooding within the Borough, we recommend the Borough implement a drainage improvement program which will upgrade the existing drainage systems and provide a positive connection to each of the new outfalls. This program can be implemented in various phases over a number of years and can be expanded to include known areas of localized flooding throughout the Borough. We recommend the following improvements for the Borough's consideration:

- **Priority No. 1 (Year 2011) – Raritan Avenue Drainage Improvements**

The Borough has authorized the preparation of design plans and specifications for the Raritan Avenue drainage improvements. The purpose of these improvements is to provide positive conveyance of stormwater runoff from the upstream areas tributary to the Raritan Avenue pump station and new outfall pipe. The improvements include the installation of a

new drainage trunk line from Beachway south along Raritan Avenue, up to East Shore Street. New drainage inlets will be installed along the trunk line alignment to capture surface (gutter flow). A new drainage pipe will extend from Raritan Avenue west up East Shore Street and Oak Street to Carr Avenue. The intersection of Carr Avenue with Oak Street and East Shore Street has been a source of persistent flooding. These improvements will reduce the frequency of flooding within the area and, when flooding does occur, will allow the area to drain in a short period time. We estimate the total project costs to be approximately \$500,000 to 550,000.

- **Priority No. 2 (Year 2012) – Beacon Light Avenue Drainage Improvements**

The improvements include the installation of a 24" drainage trunk line along Beacon Light Avenue from Shore Boulevard to Twilight Avenue. New drainage inlets will be installed along Beacon Light Avenue at the intersecting streets capture surface runoff. The purpose of the improvement is to provide positive connection of the existing upstream interior drainage system to the new stormwater pump station and outfall pipe. The trunk line has been designed for future extension of this system to address localized flooding within the tributary area. We estimate the project costs to be approximately \$300,000 to \$325,000.

- **Priority No. 3 (Year 2013) – Beachway Avenue Drainage Improvements**

The improvements include the installation of drainage improvements at the intersection of Bayview Avenue and Beachway to provide a positive connection of the existing interior drainage collection system to the proposed drainage outfall pipe. The project includes the installation of a drainage pipe landward of the new outlet structure to provide a positive connection from the drainage system in the roadway to the new outfall pipe.

In order to provide a positive flow from the drainage system in the Borough's roadway to the outfall, the plan proposes to install a new 42 inch RCP from Beachway north to the outlet chamber. A new drainage inlet will be installed on Beachway to accommodate the new 42 inch pipe. Two (2) new drainage inlets will be installed approximately 150 feet east and west of the outfall connection pipe to collect gutter flow along this portion of Beachway

and convey it to the outfall. The new drainage line will be extended southerly from the new inlet across Beachway and connect to the existing drainage system on Bayview Avenue. New inlets and piping will be installed at the intersection of Bayview Avenue and Beachway. The existing drainage system north of the Bayview and Beachway intersection will remain as it exists today and will be further analyzed and possibly considered for future phases of drainage system improvements. The intersection will be regraded and paved for approximately 50 feet east and west to provide positive gutter flow to all new drainage inlets. The total project costs are estimated to be \$150,000 to \$200,000.

- **Priority No. 4 (Year 2014) – Twilight Avenue Drainage Improvements**

The improvements include the rehabilitation of the existing 42" Twilight Avenue trunk line that installed in 1989. Over the years the existing trunk line has experienced blockage due to collapsed pipe, roadway sinkholes and poor storm water conveyance. The rehabilitation program includes an internal television inspection of the trunk line to identify defects in the existing system. The rehabilitation of the system will include internal as well as external repairs of existing piping. Since the type and limits of the repair work is unknown and will be determined by the TV inspection of the existing piping system, detailed cost estimates were not yet developed. However, for budgeting purpose we recommend the Borough allocate \$250,000.00 for this work.

- **Priority No. 5 (Year 2015) – Carr Avenue and Fishing Pier Outfall Drainage Improvements**

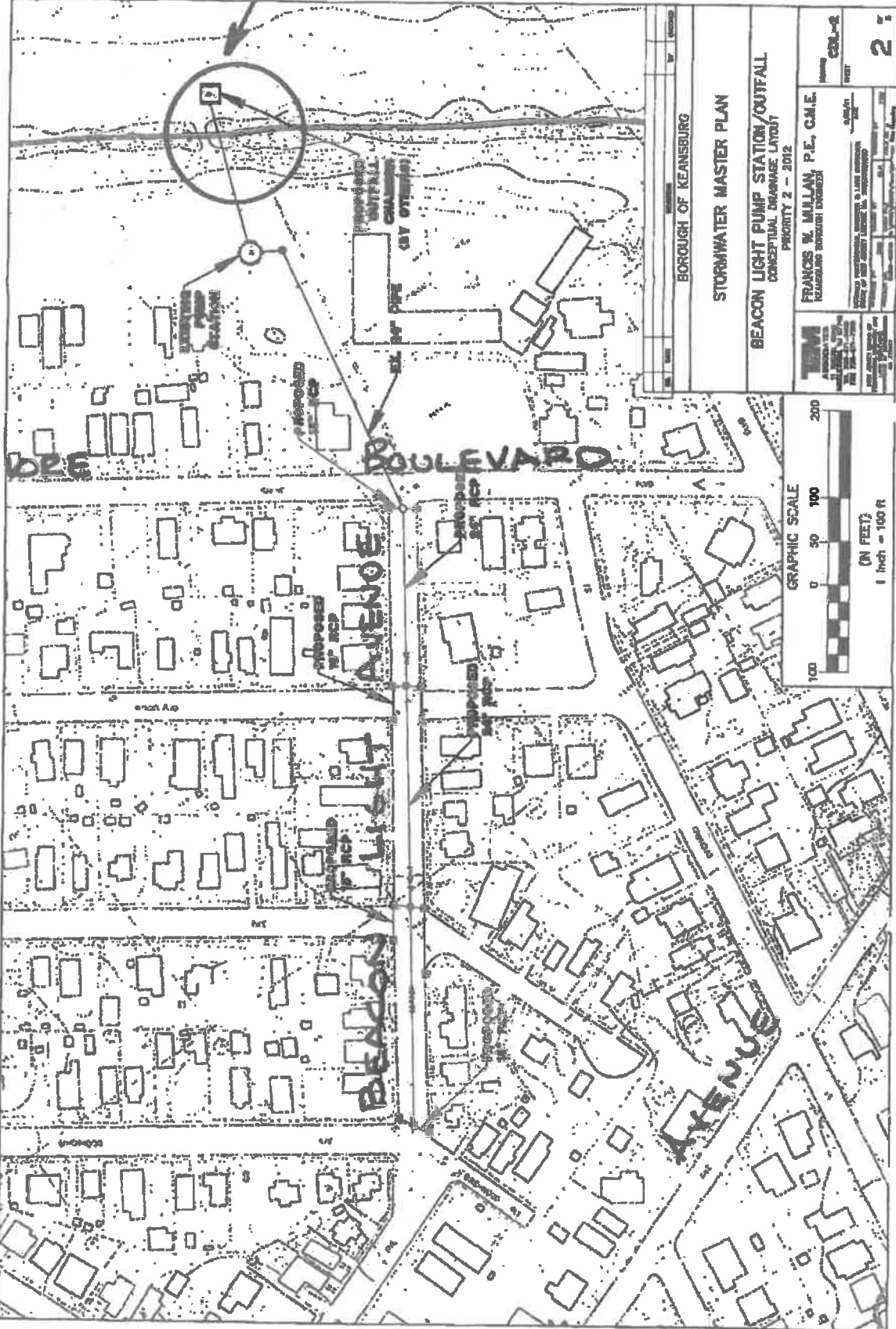
The improvements include the installation of a 24" drainage trunk line landward of the outfall structure at the Carr Avenue and fishing pier outfall to Beachway. The purpose of the improvement is to provide positive connection of the existing upstream interior drainage system to the new outfall pipe. Again the system is designed for future extension to address localized flooding within the tributary area. We estimate the project costs to be approximately \$300,000.00 to \$350,000.00.

The drainage improvement program listed above must be implemented in order for the Borough to realize the benefits of the recently installed pump stations and proposed outfall pipes. As the positive connection is made to each outfall, the drainage system may be extended to area of localized flooding within the watersheds. The proposed trunk lines will be installed as deep as possible to accommodate the extension of the systems to upstream flooding areas.



PROJECT NO. 17-1000
SEWERAGE MASTER PLAN
INDIANAPOLIS, INDIANA
DATE: 1911
BY: [Name]
CHECKED: [Name]
APPROVED: [Name]

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BOROUGH OF KEANSBURG

STORMWATER MASTER PLAN

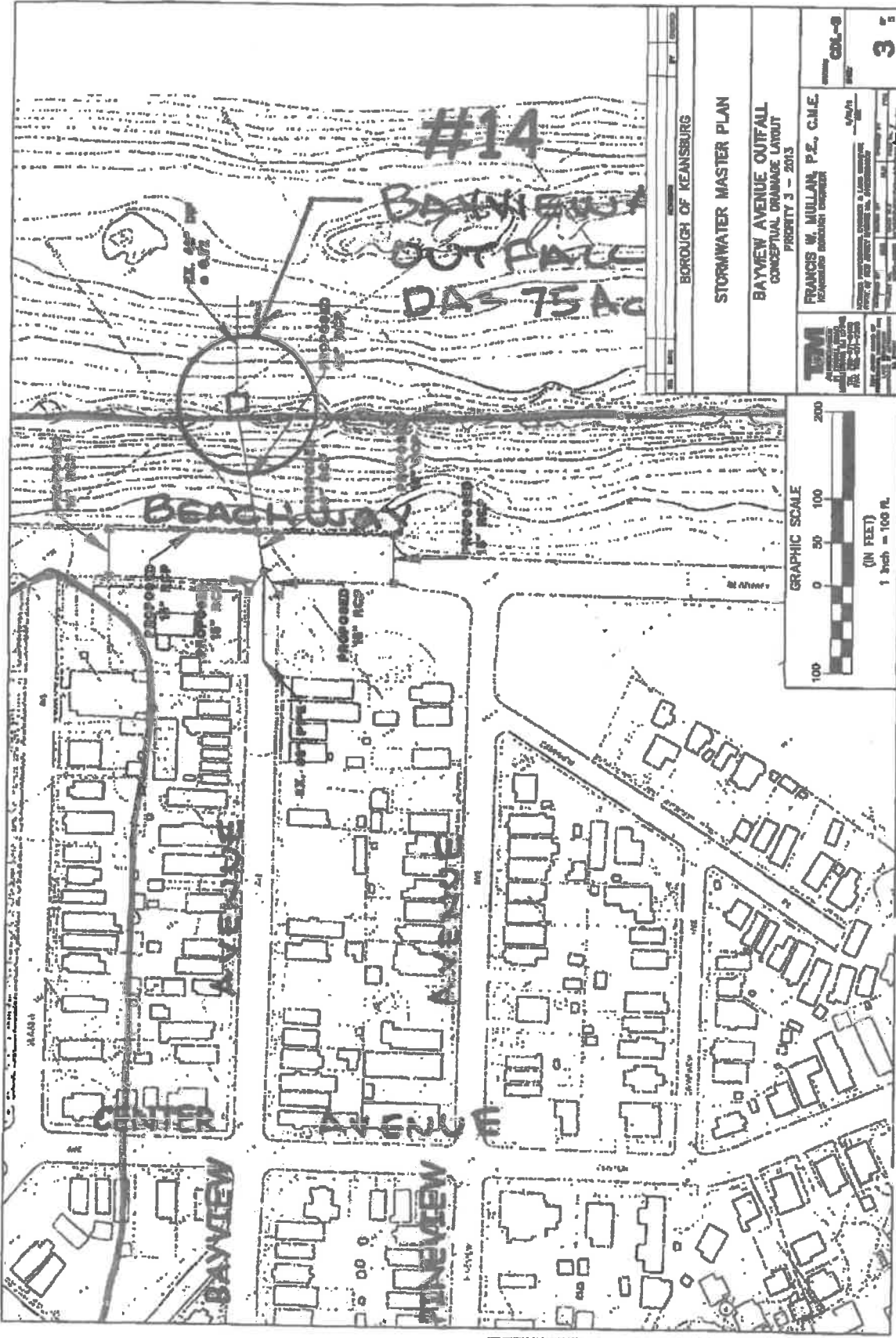
BEACON LIGHT PUMP STATION/OUTFALL
CONCEPTUAL DRAINAGE LAYOUT
PRIORITY 2 - 2012

FRANCIS W. MILLAN, P.E., C.M.E.
REGISTERED PROFESSIONAL ENGINEER

DATE: 08/20/12
PROJECT: COL-02

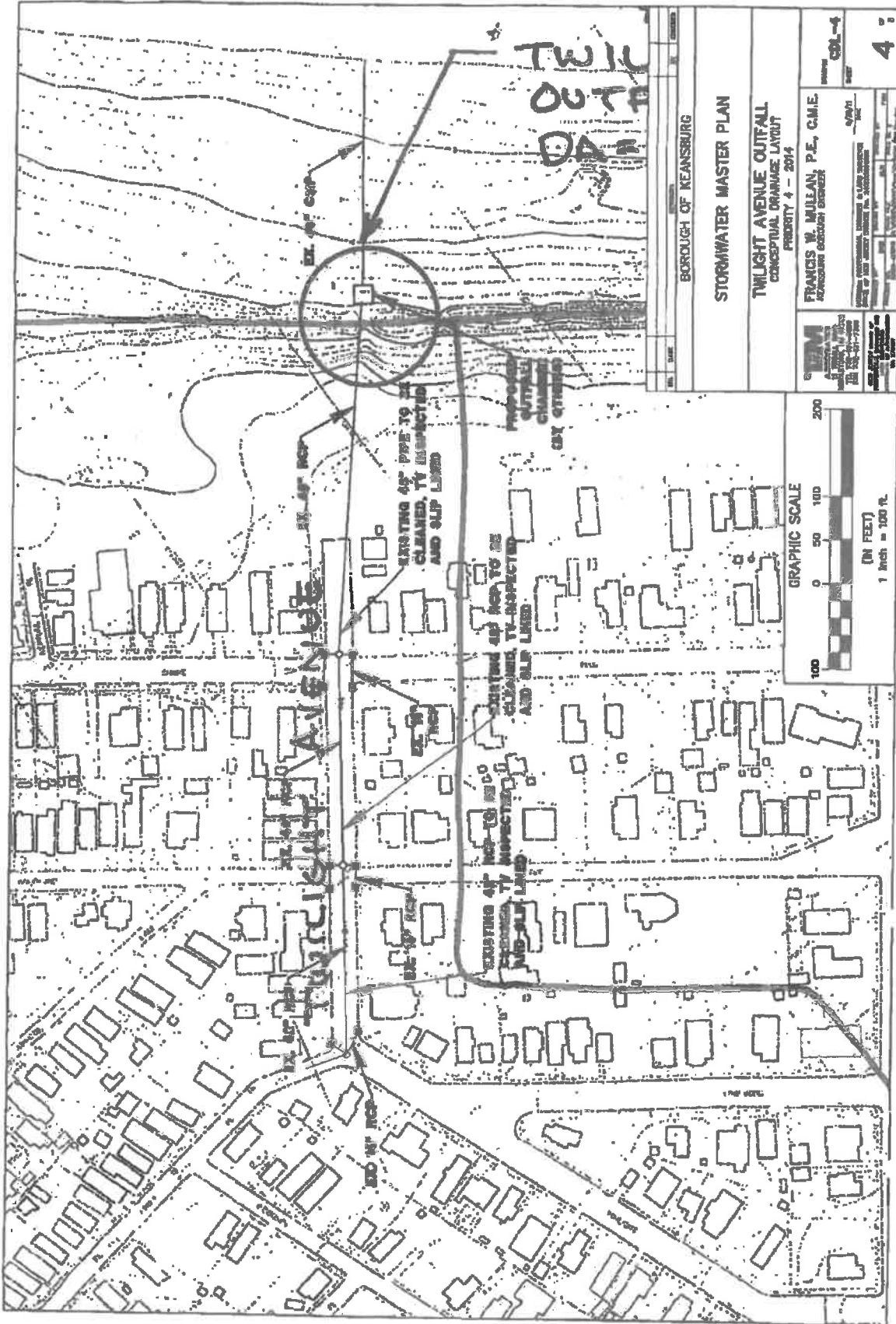


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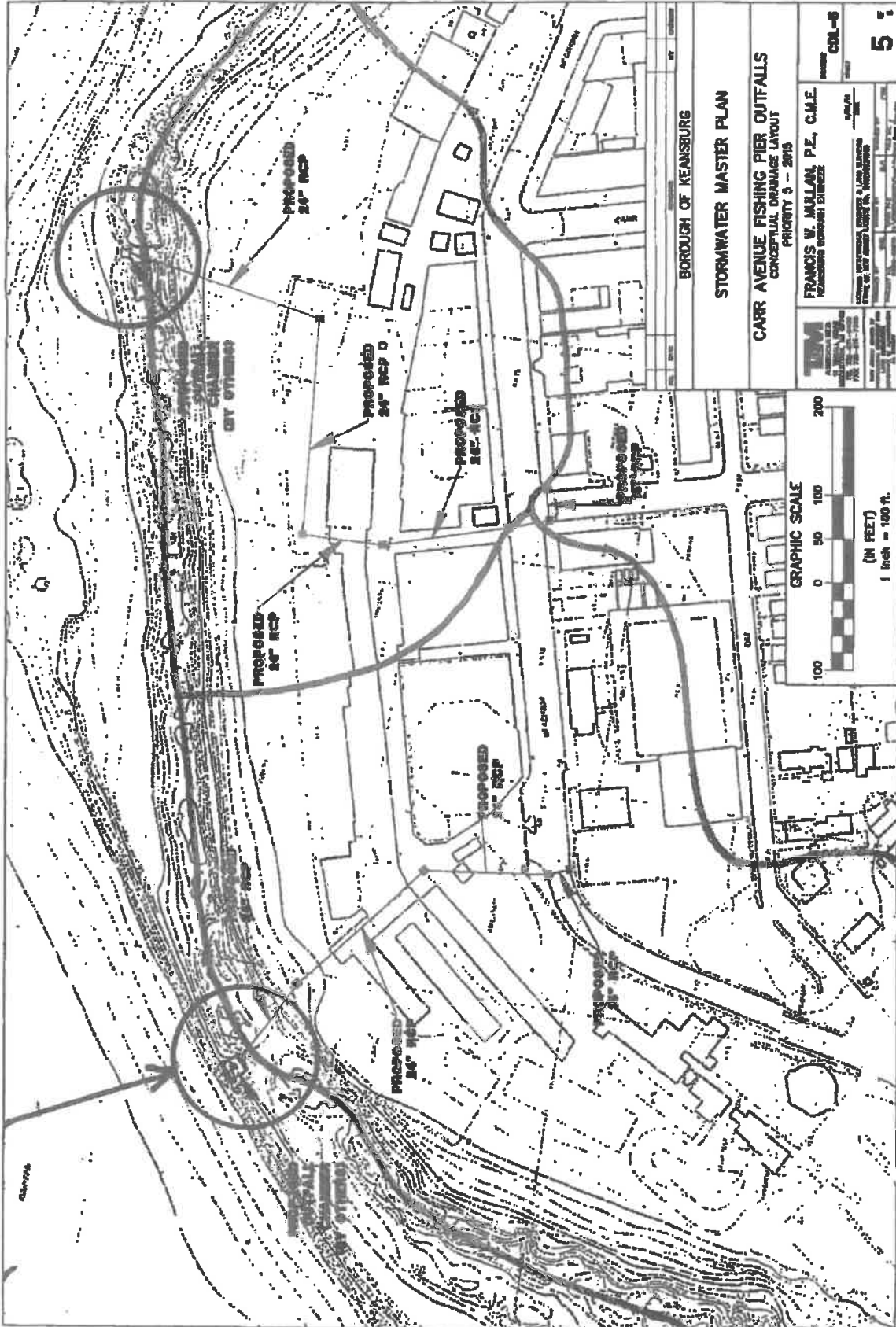
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BOROUGH OF KEANSBURG STORMWATER MASTER PLAN	
BAYVIEW AVENUE OUTFALL CONCEPTUAL DRAINAGE LAYOUT PRIORITY 3 - 2013	
FRANCIS W. MULLAN P.E., C.M.E. REGISTERED PROFESSIONAL ENGINEER	
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BOROUGH OF KEANSBURG	
STORMWATER MASTER PLAN	
TWILIGHT AVENUE OUTFALL CONCEPTUAL DRAINAGE LAYOUT PRIORITY 4 - 2014	
FRANCIS W. MULLAN, P.E., C.M.E. REGISTERED PROFESSIONAL ENGINEER	
DATE: 04/20/14	SCALE: 4" = 100'



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BOROUGH OF KEANSBURG
 STORMWATER MASTER PLAN

CARR AVENUE FISHING PIER OUTFALLS
 CONCEPTUAL DRAINAGE LAYOUT
 PRIORITY 3 - 2019

FRANCIS W. MULLAN, P.E., C.M.E.
 REGISTERED PROFESSIONAL ENGINEER

DRAWING NO. COL-8
 SCALE: 5'

