

CAPE ELIZABETH, MAINE

TOWN CENTER STORMWATER MANAGEMENT PLAN UPDATE

September 2015



This report was prepared by The Town of Cape Elizabeth under award CZM NA14NOS4190066 to the Maine Coastal Program from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration or the Department of Commerce.

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1.0 INTRODUCTION AND BACKGROUND

The 2015 Town Center Stormwater Management Plan is the latest effort to promote a stormwater management system that is cost effective, environmentally responsible and adaptable to future development. The first Town Center Plan was adopted in 1993 and included a recommendation to develop a stormwater management plan for the town center. The first Town Center Stormwater Management Plan was created in 1995 (1995 Plan). The plan guided a logical expansion of stormwater infrastructure as construction occurred on the school campus, the town fire station and public safety buildings, the community center, private properties and the construction/ reconstruction of sidewalks. Full implementation of the stormwater management plan was constrained by a lack of funding.

In 2014, the Town Council adopted an updated Town Center Plan. As one of seven recommendations, the Town Center Plan again recognized that stormwater management remained an important element of the overall Town Center vision by recommending an update to the Stormwater Management Plan.

This plan update includes an inventory of current infrastructure, identifies needs, recommends stormwater improvements and provides guidance on how new development can be integrated into the Town Center stormwater management system. The 1995 Plan provided a solid basis for stormwater management with supporting calculations and recommendations that guided improvements up to the present time. The 1995 Plan, however, was written at a time when stormwater management techniques focused on quantity and limited treatment options were available for water quality. The stormwater recommendations in this plan further explore how low impact development (LID) stormwater management techniques can be incorporated into Town Center stormwater infrastructure. Another exciting and important distinction from the 1995 Plan is the creation of a Tax Increment Financing (TIF) District in the Town Center. Revenues from the TIF District are intended to be used for the construction of sidewalks and stormwater infrastructure and this plan update can be used to support future public projects.

1.1 Vision for Stormwater Management

This Stormwater Management Plan update focuses on the existing municipal stormwater management infrastructure within the Town Center and includes conceptual improvements or expansions of the infrastructure within the public right-of-way. It is also intended, however, to consider and anticipate that some private property in the Town Center may be developed or redeveloped. The Stormwater Plans provided in **Appendix A** include conceptual approaches for stormwater management at these properties to consider potential stormwater management needs (e.g., flow increases) and/or changes that may be incorporated into the overall Town Center stormwater plan.

Actual development on these properties will be the decision of the private property owner. As Town Center property owners make improvements to property, this plan provides infrastructure information and guidance on how to manage stormwater.

1.2 Spurwink Marsh, Spurwink River and Water Quality

The majority of stormwater runoff from the Town Center discharges through the municipal separate storm sewer system (MS4) to the Spurwink Marsh that ultimately discharges to the Spurwink River. The Town has identified the Spurwink Marsh as a priority water resource based on the values it provides for habitat, flood control, water quality and recreation. Stormwater has not been identified as a significant impact to the Spurwink Marsh, however, the Town wishes to continue to preserve this resource area and avoid potentially adverse impacts while continuing to convey stormwater into the marsh. **Figure 1** below provides an overview map of the Town Center and Spurwink Marsh.



Figure 1. Map of Town Center and Spurwink Marsh

Source: Cape Elizabeth Planning Department

The Spurwink Marsh has been incorporated as a priority resource area into the Town's Stormwater Program Management Plan under the Maine Department of Environmental Protection (DEP) General Permit for the Discharge of Stormwater from Small MS4s (issued July 1, 2013). This plan identifies the Spurwink River as a priority water body and the watershed is considered a priority watershed. The Spurwink River is identified in the August 2009 Statewide Bacteria Total Maximum Daily Load (TMDL) Study as having impaired water quality due to shell fishing impacts. The TMDL does not specifically identify the source of the bacteria, but

identifies an action plan for communities to pursue that is based on investigation of bacteria sources. At this time, the Town is not aware of any significant bacteria issues in stormwater discharges from the Town Center.

This Town Center Stormwater Management Plan update does not include a specific evaluation of water quality or quantity. The conceptual stormwater improvements are considered the most practical solutions within site constraints and are anticipated to result in the greatest water quality and quantity control.

2.0 SUMMARY OF WORK PERFORMED

The Town of Cape Elizabeth retained Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) to update the Town Center Stormwater Management Plan based on prior staff experience with the original 1995 Plan. Amec Foster Wheeler staff also served as Town Engineer, following a competitive bid process. The following work was completed as part of this plan update:

- Field reconnaissance and mapping of existing infrastructure to capture changes that have occurred since the 1995 Plan.
- Review of existing stormwater best management practices (BMPs), stormwater outfalls, problem areas and/or challenges.
- Review of past proposed projects and available stormwater management plans.
- Evaluation of preferred stormwater management techniques and development of conceptual stormwater improvements.
- Development of updated plans for conceptual stormwater improvements.
- Development of planning level cost estimates for stormwater improvements within the Town right-of-way.
- Town Center Stormwater Management Plan Update with input from the Cape Elizabeth Planning Department and the Department of Public Works.

2.1 Town Center Zoning District

The plan area is the Town Center Zoning District (see **Figure 2** below), which encompasses the primary municipal buildings in Town and the largest concentration of commercial uses. The conceptual stormwater improvement plans incorporate the Town Center Zoning District and the official copy is on file at the Town Hall.

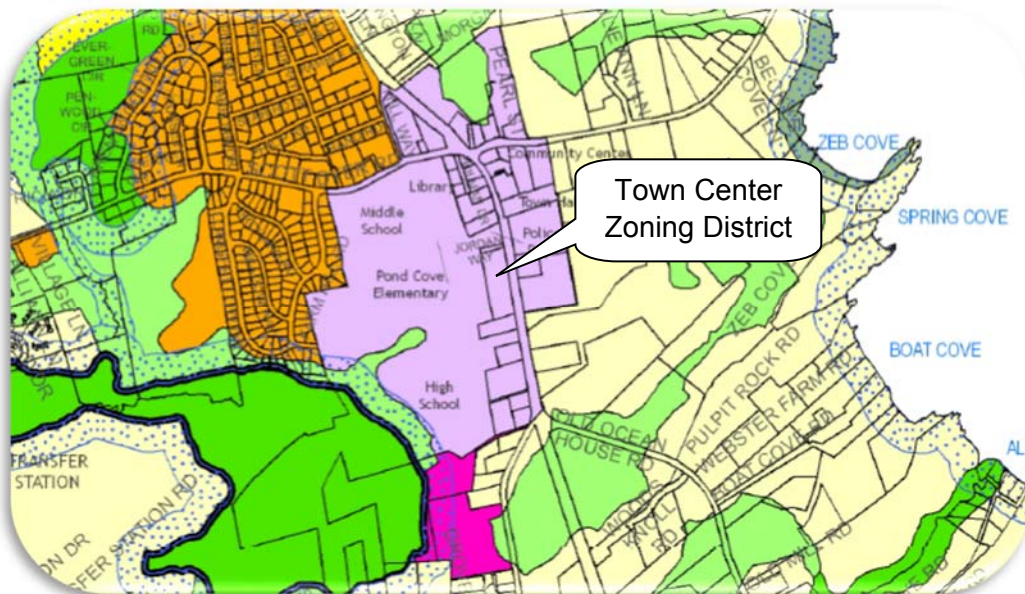


Figure 2. Town Center Zoning District

2.2 Use of this Plan Update

This plan is intended to be used as a planning and guidance document for the Town and general public. The conceptual stormwater improvements discussed and illustrated in this plan were developed based on a review of existing infrastructure and available stormwater management techniques that are preferred by Town staff. Although no stormwater calculations were performed, the proposed improvements are generally representative of the anticipated level of effort to manage stormwater and were developed by professional staff with expertise in stormwater management.

Each of the proposed stormwater improvements requires further evaluation and design and should not be relied upon as a definitive solution. Rather, some improvements may be achievable through a variety of stormwater management techniques. It should be noted that as new development and redevelopment occur throughout the Town Center, additional stormwater management evaluations (e.g., conveyance capacity, maintenance) may be needed.

3.0 EXISTING CONDITIONS AND STORMWATER CHALLENGES

For the most part, there are very few stormwater management issues and the existing storm drain infrastructure appears to be adequate to handle current conditions. Field reconnaissance, information provided by knowledgeable Town staff and a review of the work completed since the 1995 Plan were used to evaluate existing conditions and challenges related to stormwater management in the Town Center District. This information is discussed below.

3.1 Existing Stormwater Management Practices

The 1995 Plan provided a detailed analysis of drainage catchments with peak stormwater flows for existing and proposed conditions. This information and the recommendations of the 1995 Plan served as the basis for stormwater improvements over the last 20 years. A general description of the existing stormwater characteristics and infrastructure is provided below:

- ▶ **General Drainage Patterns** – the majority of the Town Center drains to the southwest and into the Spurwink Marsh. Stormwater is collected from impervious surfaces via direct (roof leader) connections and catch basins and conveyed through a series of drainage structures before discharging near or at the edge of the Spurwink Marsh. Stormwater north of Scott Dyer Road flows to the north to a common system along Ocean House Road and ultimately discharges outside of the Town Center to a nearby wetland area.
- ▶ **Storm Drain Infrastructure** – the Town Center has a total of 18,208 linear feet of storm drain pipes, 2,598 linear feet of roof drains/underdrains, 144 catch basins, and 25 drainage manholes. In addition to the specific BMPs identified in Section 3.2, there are several grass and stone-lined swales that convey stormwater between developed areas to the storm drain infrastructure.
- ▶ **Stormwater Outfalls** – there are a total of 10 stormwater outfalls within the area of the Town Center. Some outfalls are intermediate discharges that are collected by a downstream conveyance and contribute to another outfall. Outfalls #1 and #2 collect stormwater from the residential neighborhood to the west of the Town Center.

The Stormwater Plans in **Appendix A** provide detailed information related to the existing stormwater infrastructure.

3.2 Past Improvements and Existing BMPs

As part of development and redevelopment activities in the Town Center, the Town has made significant improvements to the drainage system following the 1995 Plan. In addition, the following stormwater BMPs were installed:

1. Storm filter and underground infiltration chambers at Library – treats the library parking lot/property before discharging to the drainage system that leads to Outfall #10, which ultimately leads to Outfall #3.
2. Vortechs® oil water separator treats the parking lot to the north of the High School prior to entering the drainage system for Outfall #3.
3. Vortechs® oil water separator treats the parking lot and drives adjacent to the Hannaford Multi-Purpose Field prior to entering the drainage system for Outfall #4.

4. Filterra® tree box along the parking area adjacent to the track and soccer field – treats stormwater in the catchment for Outfall #7.
5. Vortechs® oil water separator treats the parking lot adjacent to the Middle School prior to entering the detention basin for Outfall #9.
6. Detention basin adjacent to the softball field – Outfall #9.

These stormwater BMPs are noted on the plans in Appendix A. In general, these BMPs provide stormwater treatment to remove floatables (e.g., debris, trash, oils) and suspended solids (i.e., sediment and pollutants attached to soil particles). In the cases of the treatment system at the Library and the Filterra® tree box, these BMPs provide varying levels of treatment for some dissolved pollutants (e.g., nutrients) through infiltration and natural attenuation. Additionally, the detention basin provides attenuation for peak stormwater flows. It is important that these BMPs are maintained such that they function as intended with their original design.



Detention Basin Adjacent to Softball Field (in background)

3.3 Site Constraints & Challenging Areas

The following areas within the Town Center have been identified as having existing stormwater management issues:

- Soils are generally poor for infiltration and ledge is present at some locations.
- The area east of Ocean House Road is relatively flat and opportunities to connect to the storm drain infrastructure to the west are limited.

- There is limited space along the ROW adjacent to the Pond Cove Shopping Center for a sidewalk, esplanade and stormwater management.

This information was considered during the development of the proposed conceptual stormwater improvements.

4.0 FUTURE STORMWATER MANAGEMENT OPTIONS

As discussed previously, this Stormwater Management Plan update focuses on the existing municipal stormwater management infrastructure within the Town Center and includes conceptual improvements or expansions of the infrastructure within the public right-of-way. It is anticipated that some private property in the Town Center may be developed or redeveloped. This section describes the future stormwater options that the Town considers to be the most appropriate to support this vision for the Town Center.

4.1 Stormwater Management Objectives

The following key stormwater management objectives support the vision for stormwater management in the Town Center:

- Manage stormwater at the source to reduce the need for major conveyance systems (without the use of detention basins).
- Use materials and vegetation consistent with the design aesthetic of the Town Center.
- Incorporate stormwater management into landscape features that beautify the Town Center.
- Be judicious in the use of underground “out of sight, out of mind” treatment systems.

4.2 Preferred Stormwater Management Practices

To support the above objectives, the Town has identified preferred stormwater management practices that generally follow Low Impact Development (LID) principles and practices¹. The LID practices in **Table 1** were identified in no particular order.

Table 1. Preferred Stormwater Management Practices

LID Practice	Typical Application
Bioretention cells	Along edges of parking lots and roads
Underdrained bioretention swales	Narrow areas along edges of parking lots and roads
Rain gardens	Can be incorporated into numerous landscape features
Esplanade stormwater management features	Incorporate rain gardens and other stormwater features into the esplanade where possible. Work with willing abutters to make improvements with redevelopment projects.

Typical details for a bioretention cell and rain garden are provided on Sheet C-301 of the Stormwater Plans in **Appendix A**. These practices are also illustrated and described in more

¹ “LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed.” Source: <http://water.epa.gov/polwaste/green/>

detail in **Appendix B**. The Maine DEP Stormwater Manual provides additional information related to the above LID practices.

It is important to note that the above preferred stormwater management practices are intended as guidance and are consistent with the Town's desired approach for stormwater management in the Town Center. This does not preclude private properties from employing alternative stormwater management techniques, consistent with the stormwater management objectives. In addition, the Town would like to minimize "directly-connected impervious area²" as a preferred stormwater management practice to break up large impervious areas with pervious (landscape or stormwater treatment) features. The LID practices identified in Table 1 are consistent with this approach and help to management stormwater at the source versus management over a much larger impervious area.

4.3 Additional Stormwater Management Options

In some cases, additional stormwater management options may be needed due to site constraints and/or to handle the volume and intensity of stormwater resulting from new and redevelopment projects. Additional stormwater management techniques and options in the Maine DEP Stormwater Manual can be considered in addition to opportunities to enhance stormwater management using existing infrastructure within the Town Center. The following areas were identified for future stormwater management if needed to provide additional capacity and/or treatment within the Town Center:

- Retrofit the detention pond and outlet structure for Outfall #9 – this area could be rehabilitated and modified to provide additional stormwater treatment. For example, a more significant modification would be conversion to a gravel wetland.
- Disconnect roof leaders from buildings and discharge to pervious areas through vegetated swales, bioretention swales or cells.
- Disconnect impervious surfaces at various parking areas throughout the Town Center and provide treatment through vegetated parking lot dividers, bioretention swales or cells.
- Consider porous pavement and other pervious surfaces as existing paved areas are rehabilitated and/or replaced.
- Install proprietary treatment devices at areas that are prone to sediment accumulation and/or significant snow accumulation and disposal.

These options would need to be evaluated further to determine the benefit provided based on the cost to enhance the existing infrastructure (e.g., pipe size upgrades, construction of new stormwater management facilities). It should be noted that these options are not preferred since

² Directly-connected impervious area (DCIA) can be generally defined as impervious area (e.g., buildings, pavement and hard surfaces) with a direct hydraulic connection to the drainage system or a water body via continuous paved surfaces, gutters, drain pipes and conventional stormwater conveyance structures.

they typically rely on managing stormwater once it is collected versus at the source with LID practices.

4.4 Conceptual Stormwater Improvements and Budget Estimates

The Stormwater Plans in **Appendix A** illustrate the existing conditions and conceptual stormwater improvements that have been developed for the Town Center. **Table 2** provides a summary of the budget estimates that were developed for conceptual stormwater improvements within the Town right-of-way (ROW).

Table 2. Conceptual Stormwater Improvements and Estimated Costs

ID	Description	Parcel ID	Budget Estimate*
A	Sidewalk w/ esplanade (6 locations)**	N/A	\$250 - \$350 per LF
B	Stormwater conveyance across Town property – esplanade connection	U21-12	\$30,000 - \$40,000
C	Village Green concept plan – rain garden and bioretention cell	R2-1-4-6	N/A
D	Private Development – rain gardens and underdrained bioretention swales	U11-16A	N/A
E	Private Development – rain gardens and underdrained bioretention swales	U11-16B	N/A
E-2	Shore Road at Ocean House Road – catch basin for surface ponding	N/A	\$30,000 - \$40,000
F	Private Development – bioretention cells	U22-76	N/A
G	Private Development - underdrained bioretention swales	U22-74	N/A
H	Hill Way & Ocean House Road – swale enhancements, snow storage area & pipe upgrades	U23-4	\$100,000 - \$150,000

Notes: *does not include conceptual stormwater improvements outside of the Public ROW. **Additional information regarding sidewalks and esplanade locations is available in the 2014 Town Center Plan (adopted 10-6-14).

A range of cost is provided for budgetary purposes and estimates were developed based on unit cost data for the proposed infrastructure and Amec Foster Wheeler's experience with similar projects. More detailed descriptions of the conceptual stormwater improvements are provided in **Appendix C**.

5.0 PRIORITY AREAS AND RECOMMENDATIONS

Based on input from Town staff, the following priority areas and recommendations were developed:

- **Ocean House Road along the Pond Cover Shopping Center** – there is limited space for the sidewalk and esplanade planned for this area, which will also need to consider stormwater improvements.
- **Intersection of Ocean House Road and Shore Road** – During the 2015 summer, the Town repaved this area and decreased the extent of surface ponding. The Town plans to monitor the area to assess the need for future drainage infrastructure improvements.
- **Hill Way and Ocean House Road** – the drainage swales along the east side of Hill Way and west side of Ocean House Road (north of Scott Dyer Road) need to be rehabilitated and enhanced. This will support future stormwater improvements.

The Town will continue to evaluate opportunities to incorporate stormwater management improvements as new and redevelopment activities occur throughout the Town Center. This Plan Update will serve as a guidance document and support the use of TIF District funds for implementation of projects within the public ROW.

Appendix A

Stormwater Plans: Sheets G-001, C-101, C-102 & C-301

TOWN OF CAPE ELIZABETH TOWN CENTER STORMWATER MANAGEMENT PLAN UPDATE

Cape Elizabeth, Maine

Prepared For:

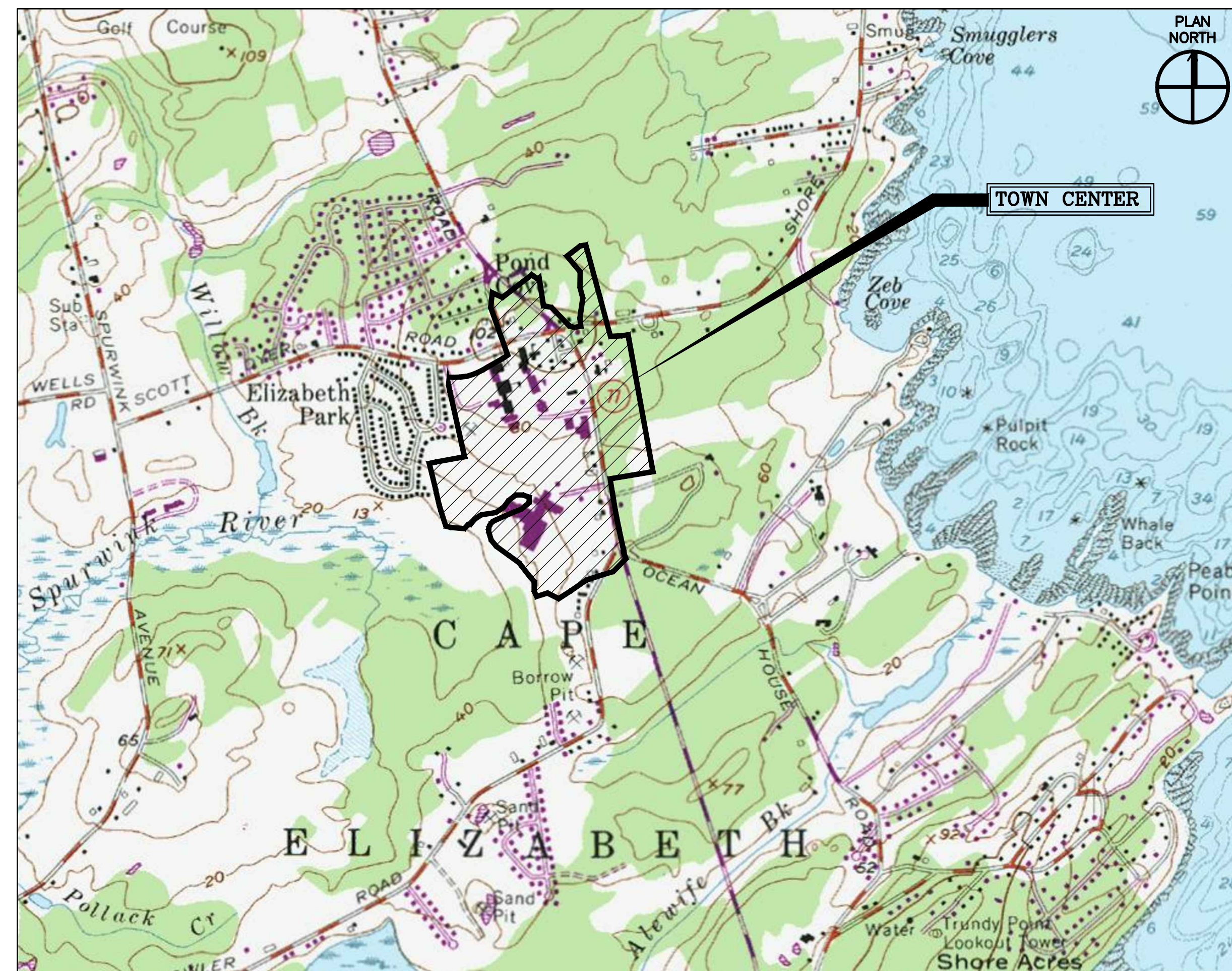
TOWN OF CAPE ELIZABETH

Prepared By:

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LOCATION MAP

SCALE: 1"=1,000'(±)

INDEX OF DRAWINGS

SHEET NO.	DWG. NO.	DRAWING TITLE
1	G-001	TITLE SHEET
2	C-101	CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
3	C-102	CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
4	C-301	CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT DETAILS

CURRENT ISSUE STATUS:

PROJECT:
CONCEPTUAL STORM DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
CAPE ELIZABETH TOWN CENTER

REV	REVISION	ISSUE DESCRIPTION	DATE

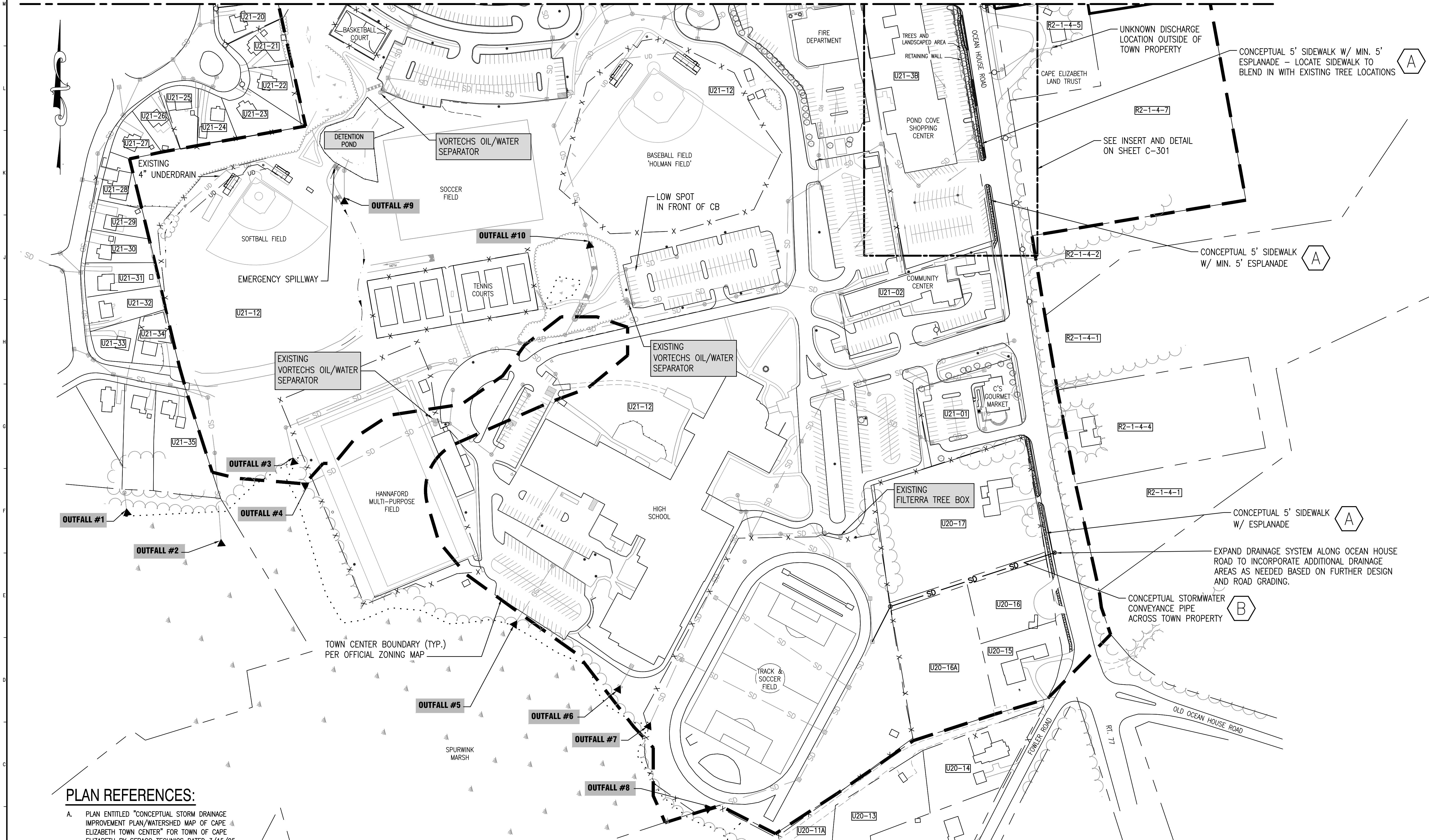
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PROJECT MANAGER: RBN
A/E OF RECORD: SDH
DRAWN BY: DAB
CAD FILE: G-001
SCALE: NTS

GRAPHIC SCALE:
0" 1"

TITLE:
CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP

DRAWING NO:
G-001
SHEET: 1 OF 4

MATCH LINE SEE C-102



PLAN REFERENCES:

- A. PLAN ENTITLED "CONCEPTUAL STORM DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP OF CAPE ELIZABETH TOWN CENTER" FOR TOWN OF CAPE ELIZABETH BY SEBAGO TECHNICS DATED 3/15/95.
- B. PLAN PREPARED BY RICHARD D. MANTHORNE (PLS #653) DATED 9-10-91. INFORMATION PROVIDED ON THIS PLAN OBTAINED FROM CAPE ELIZABETH TAX MAPS, AERIAL PHOTOGRAPHS, AND AVAILABLE PLANS FROM TOWN OF CAPE ELIZABETH.
- C. AERIAL TOPOGRAPHICAL PLAN DATED 1-26-94 PREPARED BY STEVENS, MORTON, ROSE & THOMPSON (S.M.R.T.).
- D. AUTOCAD GRADING/UTILITY PLAN FOR CAPE ELIZABETH MIDDLE SCHOOL EXPANSION PROJECT DATED 2-25-94, LAST REVISION 6-3-94 AS PREPARED BY STEVENS, MORTON, ROSE & THOMPSON, PORTLAND, MAINE.

GENERAL NOTES:

1. EXISTING DRAINAGE AND UTILITY INFORMATION SHOWN WAS COMPILED BASED UPON FIELD RECONNAISSANCE, COMMUNICATIONS WITH CAPE ELIZABETH PUBLIC WORKS DEPARTMENT AND AVAILABLE PLAN INFORMATION.
2. THIS PLAN IS FOR INFORMATIONAL AND PLANNING PURPOSES ONLY. ALL FEATURES SHOULD BE FIELD VERIFIED BY CONTROLLED SURVEY PRIOR TO FINAL DESIGN OR CONSTRUCTION WORK. REFER TO TAX MAPS FOR PROPERTY INFORMATION.
3. ACTUAL PIPE DIAMETERS, MATERIALS AND CONDITIONS SHALL BE CONFIRMED PRIOR TO THE DESIGN OF ANY SYSTEM IMPROVEMENTS OR PRIVATE PROPERTY DEVELOPMENT.

NOTE:
SEE SHEET C-102 FOR LEGEND

NOTE:
SEE SHEET C-301 FOR PROPERTY INFORMATION

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REV	REVISION	DATE

CURRENT ISSUE STATUS:
PROJECT:
CONCEPTUAL STORM DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
CAPE ELIZABETH TOWN CENTER

REV	REVISION	DATE

PROJECT NUMBER: 3618148433
PROJECT MANAGER: RBN
A/E OF RECORD: SDH
DRAWN BY: DAB
CAD FILE: C-101
SCALE: 1" = 100'
GRAPHIC SCALE:
0" 1"
TITLE:
CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
DRAWING NO:
C-101
SHEET: 2 OF 4
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LEGEND

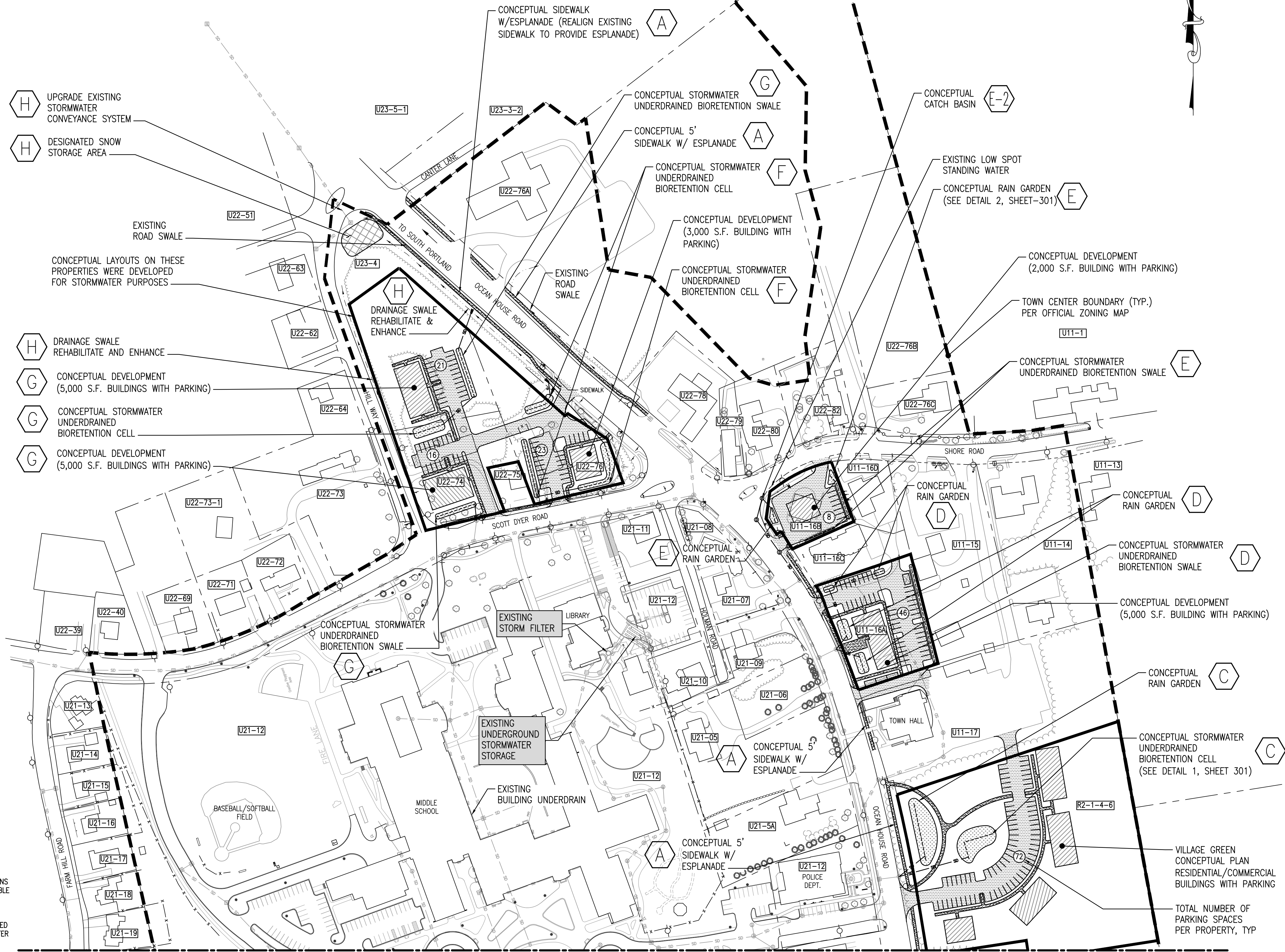
- TOWN CENTER BOUNDARY
- CONCEPTUAL ID (SEE TOWN CENTER STORMWATER PLAN UPDATE FOR CONCEPT DESCRIPTION)
- CONCEPTUAL AREAS
- NUMBER OF PARKING SPACES (CONCEPTUAL)
- PARCEL MAP/LOT
- CONCEPTUAL STORM DRAIN
- CONCEPTUAL UNDERDRAIN
- CONCEPTUAL STORMWATER TREATMENT PRACTICE
- CONCEPTUAL SIDEWALK
- CONCEPTUAL PAVEMENT
- CONCEPTUAL BUILDING
- EXISTING STORMWATER TREATMENT PRACTICE
- EXISTING STORM DRAIN
- EXISTING UNDERDRAIN
- EXISTING BUILDING ROOFDRAIN OR UNDERDRAIN
- CATCH BASIN
- STORM DRAIN MANHOLE
- STORMWATER OUTFALL
- EXISTING FENCE LINE
- EXISTING VEGETATION LINE
- PROPERTY LINE
- UPGRADE EXISTING STORMWATER CONVEYANCE SYSTEM
- DESIGNATED SNOW STORAGE AREA
- DRAINAGE SWALE REHABILITATE AND ENHANCE
- CONCEPTUAL DEVELOPMENT (5,000 S.F. BUILDINGS WITH PARKING)
- CONCEPTUAL STORMWATER UNDERDRAINED BIORETENTION CELL
- CONCEPTUAL DEVELOPMENT (5,000 S.F. BUILDINGS WITH PARKING)

PLAN REFERENCES:

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MATCH LINE SEE C-101

NOTE: SEE SHEET C-301 FOR PROPERTY INFORMATION

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CONCEPTUAL STORM DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
 CAPE ELIZABETH TOWN CENTER

REV	REVISION	ISSUE	DESCRIPTION	DATE

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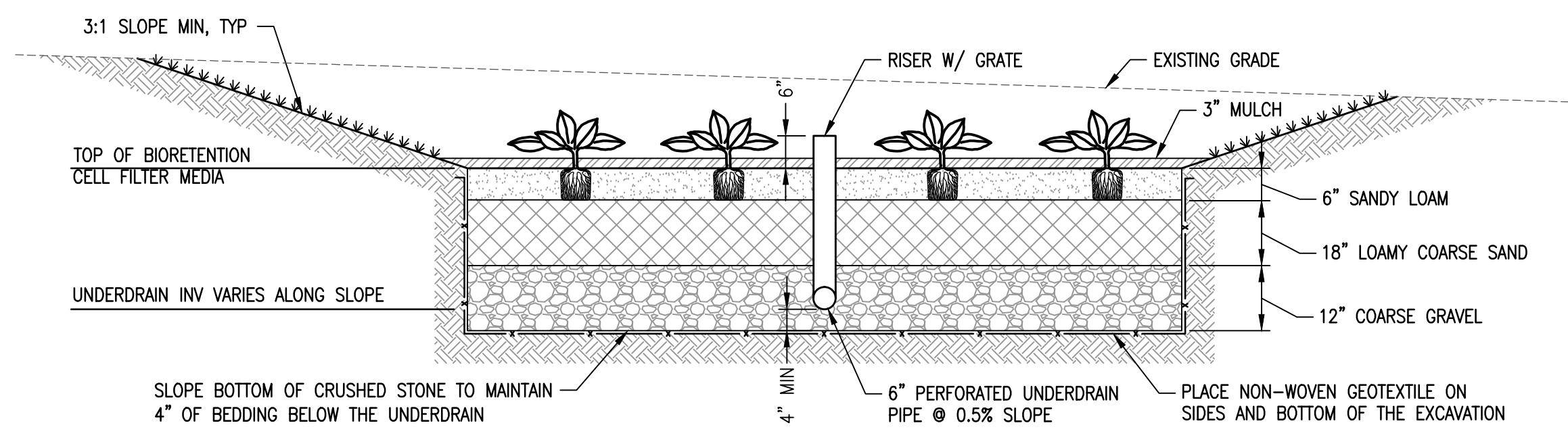
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DRAWING NO:
C-102

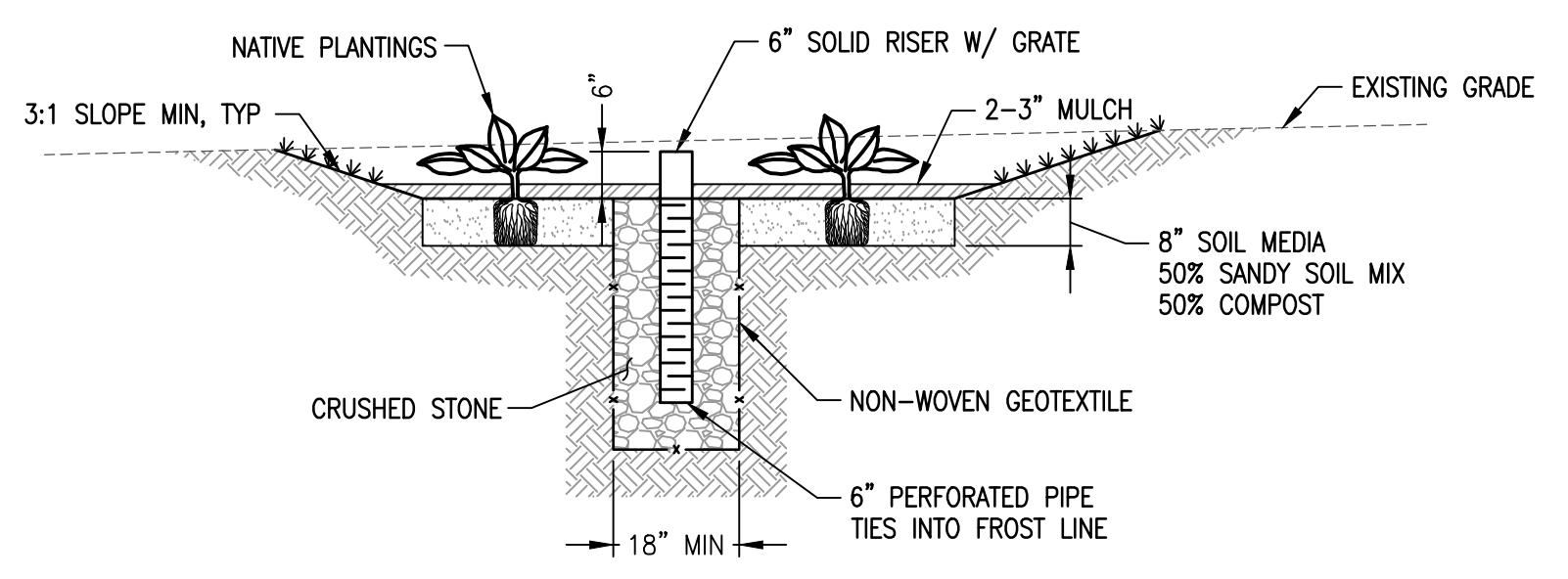
SHEET: 3 OF 4

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NOTE: DETAILS PROVIDED ARE FOR CONCEPTUAL PURPOSES ONLY.

1 BIORETENTION CELL DETAIL
SCALE: N.T.S.



NOTE: DETAILS PROVIDED ARE FOR CONCEPTUAL PURPOSES ONLY.

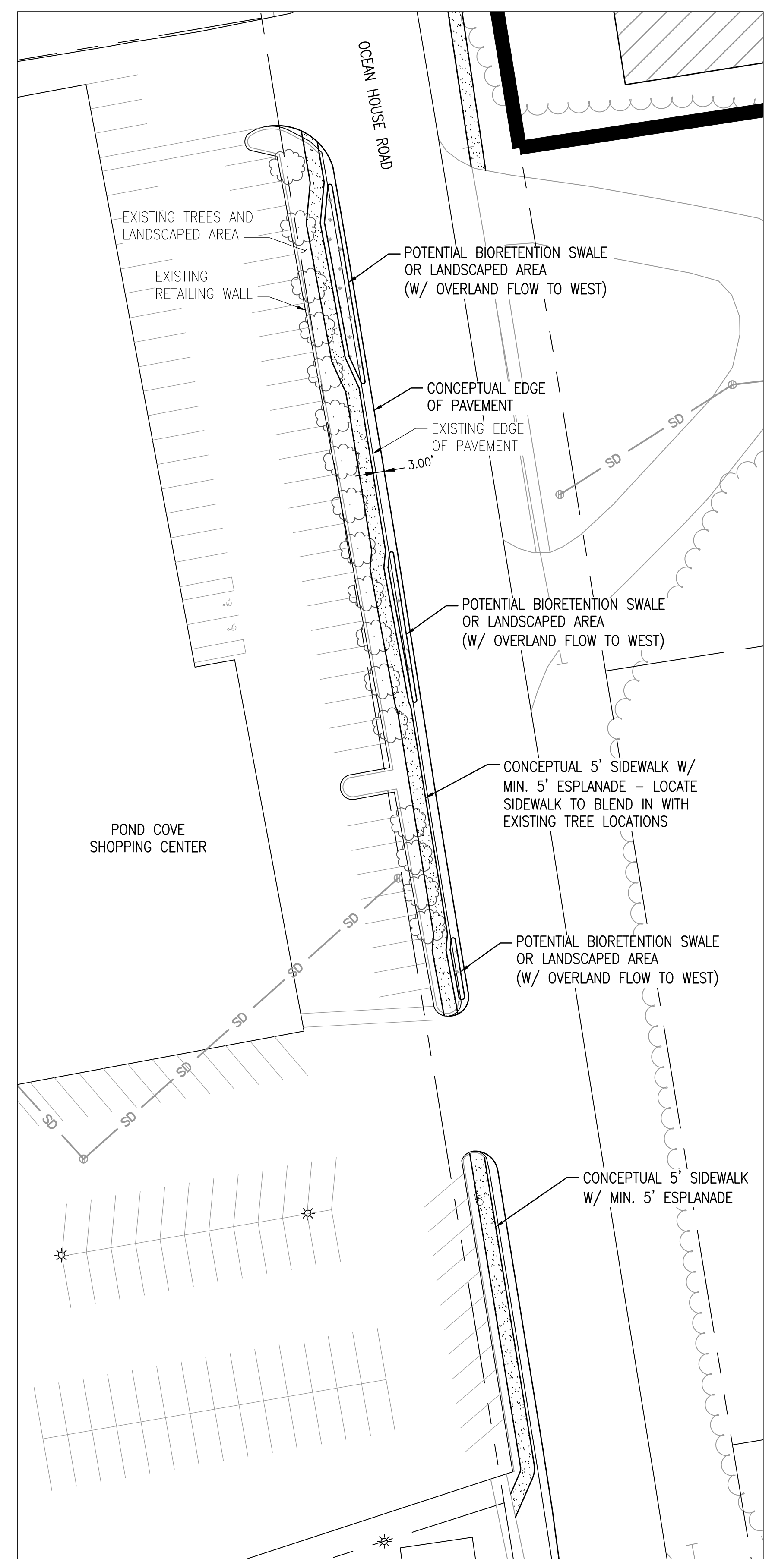
2 RAIN GARDEN DETAIL
SCALE: N.T.S.

TOWN CENTER PROPERTY AND ABUTTER INFORMATION

ZONE	MAP-LOT	OWNER_NAME	OWNER	PROPERTY
RA	R2-1-4-1	HIDDEN COURT LLC	C/O HOULE LYNNE BERNSTEIN SHUR	340 OCEAN HOUSE ROAD
RA	R2-1-4-2	FIELD WINDS LLC	C/O VERRILL DANA LLP	336 OCEAN HOUSE ROAD
RA	R2-1-4-4	CLARKE FAMILY REVOCABLE TRUST	CLARK JAMES R & ANN B TRUSTEES	350 OCEAN HOUSE ROAD
RA	R2-1-4-7	FIELD WINDS LLC	C/O VERRILL DANA LLP	337 OCEAN HOUSE ROAD
RA	U11-1	HAYWOOD FRANCIS		1221 SHORE ROAD
RA	U11-13	RAND PETER W &	RAND ALICE H	1222 SHORE ROAD
RA	U20-11A	MURRAY LP & SONS		0 FOWLER ROAD
RA	U20-13	MURRAY LP & SONS INC	WESCOTT ELEANOR TC	0 FOWLER ROAD
RA	U20-14	PITT ROBERT	COUTTS CHENANGO	7 FOWLER ROAD
RA	U23-3-2	POND KIRK P		1 CANTER LANE
RA	U23-3-3	MORGAN LANE REALTY TRUST	POND KIRK P TRUSTEE	5 CANTER LANE
RA	U23-5-1	ACETO HOLLY H &	ACETO ROBERT A	252 OCEAN HOUSE ROAD
RC	U21-13	ST AMAND THEODORE &	ST AMAND LORI E	2 FARM HILL ROAD
RC	U21-14	BEELER PAULINE R		4 FARM HILL ROAD
RC	U21-15	CRAIG MATTHEW G	GALVIN THERESA C	6 FARM HILL ROAD
RC	U21-16	CROWLEY LISA M &	LAGASSE MARY ELLEN	8 FARM HILL ROAD
RC	U21-17	WARNER VERONICA F		10 FARM HILL ROAD
RC	U21-18	CALABRESE DAVID C		12 FARM HILL ROAD
RC	U21-19	FOX JAMES M &	FOX THERESA GEDARA	14 FARM HILL ROAD
RC	U21-20	CLARK TROY W &	CLARK JANE A	16 FARM HILL ROAD
RC	U21-21	GREGORY MELORA S		18 FARM HILL ROAD
RC	U21-22	AUSTIN STEPHEN T		20 FARM HILL ROAD
RC	U21-23	DELAGUERONNIERE JUDY R		22 FARM HILL ROAD
RC	U21-24	BURLESON CHRISTOPHER	TARBOX LISA	24 FARM HILL ROAD
RC	U21-25	DAVENPORT DAVID G &	DAVENPORT MARGARET	26 FARM HILL ROAD
RC	U21-26	DORVAL MARK		28 FARM HILL ROAD
RC	U21-27	MUNZ CHRISTOPHER S &	MUNZ JULIE C	30 FARM HILL ROAD
RC	U21-28	MORIN ROLAND E &	MORIN JEAN C	32 FARM HILL ROAD
RC	U21-29	RENZ KATHARINE J		34 FARM HILL ROAD
RC	U21-30	TOOTHAKER LESLIE F &	TOOTHAKER LORETTA J	36 FARM HILL ROAD
RC	U21-31	RANAGHAN PAMELA A		38 FARM HILL ROAD
RC	U21-32	GRIMARD WILLIAM V &	GRIMARD FLORENCE	40 FARM HILL ROAD
RC	U21-33	CONCANNON MATTHEW S &	CONCANNON CULLEN G	60 LONGFELLOW DRIVE
RC	U21-34	DAVIS RACHEL Q	DAVIS KEVIN M	62 LONGFELLOW DRIVE
RC	U21-35	SKILLIN WENDY E		63 LONGFELLOW DRIVE

ZONE	MAP-LOT	OWNER_NAME	OWNER	PROPERTY
TC	R2-1-4-5	CAPE ELIZABETH LAND TRUST		330 OCEAN HOUSE ROAD
TC	R2-1-4-6	HAFFENREFFER R F IV TRUST	HAFFENREFFER R F IV TRUSTEE	326 OCEAN HOUSE ROAD
TC	U11-14	FOXTROT PROPERTIES LLC	C/O JOHNSON CRAIG	1226 SHORE ROAD
TC	U11-15	KLS LLC		1230 SHORE ROAD
TC	U11-16A	ISIS DEVELOPMENT LLC		316 OCEAN HOUSE ROAD
TC	U11-16B	1234 SHORE ROAD LLC	C/O BENOIT TIMOTHY ESQ	1234 SHORE ROAD
TC	U11-16C	OCEAN HOUSE CONDOMINIUMS		312 OCEAN HOUSE ROAD
TC	U11-16D	CAPE DENTAL ASSOCIATES		1232 SHORE ROAD
TC	U11-17	TOWN OF CAPE ELIZABETH		320 OCEAN HOUSE ROAD
TC	U20-15	JORDAN NORMAN JR		359 OCEAN HOUSE ROAD
TC	U20-16	JORDAN NORMAN R JR		0 OCEAN HOUSE ROAD
TC	U20-16A	JORDAN NORMAN R JR		0 OCEAN HOUSE ROAD
TC	U20-17	BLAKE RACHELY	BLAKE ANDREW W	351 OCEAN HOUSE ROAD
TC	U21-1	KMC PROPERTIES LLC		349 OCEAN HOUSE ROAD
TC	U22-74	HILL JANET S		12 HILL WAY
TC	U22-76	V S H REALTY INC	CUMBERLAND FARMS INC	287 OCEAN HOUSE ROAD
TC	U22-76A	METHODIST CHURCH		280 OCEAN HOUSE ROAD
TC	U22-76B	DONNELLY JON PATRICK &	TOWNSEND MARY ELIZABETH	5 PEARL STREET
TC	U22-76C	DILL CYNTHIA A &	CLARKE THOMAS C	1227 SHORE ROAD
TC	U22-78	CUMBERLAND FARMS INC		298 OCEAN HOUSE ROAD
TC	U22-79	LONG EDDY REALTY TRUST	BEAN CHARLES TRUSTEE	1237 SHORE ROAD
TC	U22-80	JOHNSON EVERETT F JR &	JOHNSON LUNDA BEER	1235 SHORE ROAD
TC	U22-82	VOELKER PROPERTIES LLC		1231 SHORE ROAD
TC	U23-4	TOWN OF CAPE ELIZABETH		0 OCEAN HOUSE ROAD
RC	U22-39	HALLOWELL MILTON L &	HALLOWELL MARGUERITE C	29 SCOTT DYER ROAD
RC	U22-40	BROWN NANCY L		025 SCOTT DYER ROAD
RC	U22-51	CAMPBELL JENNY ANN &	CAMPBELL DOUGLAS A	259 OCEAN HOUSE ROAD
RC	U22-62	MCTHENY ERIN	MEUSE MICHAEL	5 HILL WAY
RC	U22-63	DAYN CAROL DANIELLI		3 HILL WAY
RC	U22-64	CHANDLER SUSAN E	COUGHLIN ROBERT C JR	2 RAND ROAD
RC	U22-69	LOGUDICE SUSAN E &	LONG ROGER W	19 SCOTT DYER ROAD
RC	U22-71	IMONDI DOREEN F	C/O LJM PROPERTIES LLC	15 SCOTT DYER ROAD
RC	U22-72	DOWNING THOMAS J (TC)	BUTSON MARY ANN (TC)	11 SCOTT DYER ROAD
RC	U22-73	LAWSURE THERESA A		11 HILL WAY
RC	U22-73-1	QUIRK SHIRLEY F		9 SCOTT DYER ROAD

NOTE: SEE TOWN OF CAPE ELIZABETH ASSESSING DEPARTMENT FOR OFFICIAL PROPERTY RECORDS.



3 POND COVE SHOPPING CENTER INSERT
SCALE: 1" = 30'

511 Congress St., Suite 200, Portland ME 04101
P: (207) 775-5401 F: (207) 772-4762
www.amecfw.com

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PROJECT: CONCEPTUAL STORM DRAINAGE IMPROVEMENT PLAN/WATERSHED MAP
CAPE ELIZABETH TOWN CENTER

REV	REVISION	ISSUE DESCRIPTION	DATE

PROJECT NUMBER: 3618148433
PROJECT MANAGER: RBN
A/E OF RECORD: SDH
DRAWN BY: DAB
CAD FILE: C-301
SCALE: AS NOTED
GRAPHIC SCALE: 0" = 1"
TITLE: CONCEPTUAL STORMWATER DRAINAGE IMPROVEMENT DETAILS
DRAWING NO: C-301
SHEET: 4 OF 4

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Appendix B
Typical BMP Descriptions and Illustrations

Typical BMP Descriptions and Illustrations

The following preferred LID stormwater management practices for the Town Center are described and illustrated below.

- ▶ **A. Bioretention Cells**
- ▶ **B. Underdrained Bioretention Swales**
- ▶ **C. Rain Gardens**
- ▶ **D. Esplanade Stormwater Management Features**

These practices fall under the general category of bioretention systems. Bioretention systems are generally shallow, landscaped depressions with soil and vegetation that are small in size and typically distributed throughout a contributing area. Bioretention systems can be designed with or without an underdrain system and/or liner depending on whether infiltration to the subsurface is permissible. Due to the generally poor soils and shallow depth to bedrock in the Town Center, bioretention systems with an underdrain are proposed since infiltration of stormwater into the subsurface is anticipated to be limited.

Stormwater runoff receives treatment by filtering through the native, amended or complex soil matrix and through uptake by native woody and herbaceous plants that are chosen based on site conditions. Bioretention systems are able to reduce sediments and uptake nutrients, oil and grease and trace metals. Designers should use the general and specific design criteria for Underdrained Bioretention Cells presented in Section 7.2 of Volume III of the Maine Stormwater BMPs Manual for all bioretention systems.

A. Bioretention Cells

These systems generally incorporate a complex soil matrix and an underdrain system. Bioretention cells can be incorporated into a variety of landscape features and configurations, but should be designed to connect the underdrain to a nearby stormwater conveyance.



Bioretention Cell, South Portland, Maine

B. Underdrained Bioretention Swales

Typical BMP Descriptions and Illustrations

These systems are similar to a bioretention cell but are configured to capture stormwater runoff along a narrow area and enhance treatment versus the alternative of a grass-lined swale.



Underdrained Bioretention Swale, South Portland, Maine

C. Rain Gardens

Rain gardens are simpler types of bioretention cells with native or amended soils, vegetation and no underdrain. Rain gardens should have a subsurface drain to alleviate ponding during freeze/thaw cycles and can be designed to overflow to an adjacent stormwater conveyance system. Rain gardens are typically designed to capture stormwater from small, adjacent areas.



Rain Garden at Bayside Trail, Portland, ME



Rain Garden at Parmenter School, Franklin, MA

D. Esplanade Stormwater Management Features

The esplanade is intended to be pedestrian friendly and enhance the Town Center consistent with the planning objectives in the 2014 Town Center Plan. The above bioretention systems can be

Typical BMP Descriptions and Illustrations

incorporated into the esplanade where space is available and grading is appropriate. The Town would like to encourage property abutting the existing and proposed esplanade to incorporate stormwater management features as redevelopment occurs. The 2014 Town Center Plan resulted in renditions including the one below that illustrates the esplanade concept and can be used to considering how the above bioretention systems can be incorporated.



Esplanade Rendering of Route 77 Adjacent to Pond Cove Shopping Center

The esplanade is also a good example of an opportunity to disconnect impervious surfaces, while maintaining the same intended purpose. Below is an example of a disconnected impervious surface approach for a site in Rhode Island.



Example of Disconnecting Impervious Area from a Parking Lot in Providence, RI

Appendix C

Description of Proposed Conceptual Stormwater Improvements

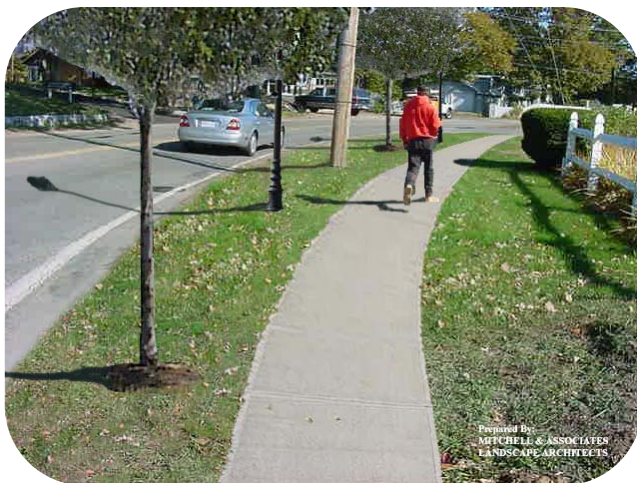
Description of Proposed Conceptual Stormwater Improvements

A. Sidewalk w/ Esplanade (6 locations)

The esplanade is intended to be pedestrian friendly and enhance the Town Center consistent with the planning objectives in the 2014 Town Center Plan. The Town would like to encourage property abutting the existing and proposed esplanade to incorporate stormwater management features as redevelopment occurs. Bioretention systems such as rain gardens and bioretention cells can be incorporated into the esplanade where space is available and grading is appropriate. The 2014 Town Center Plan resulted in renditions including the one below that illustrates the esplanade concept and can be used to consider how bioretention systems such as rain gardens and bioretention cells can be incorporated.



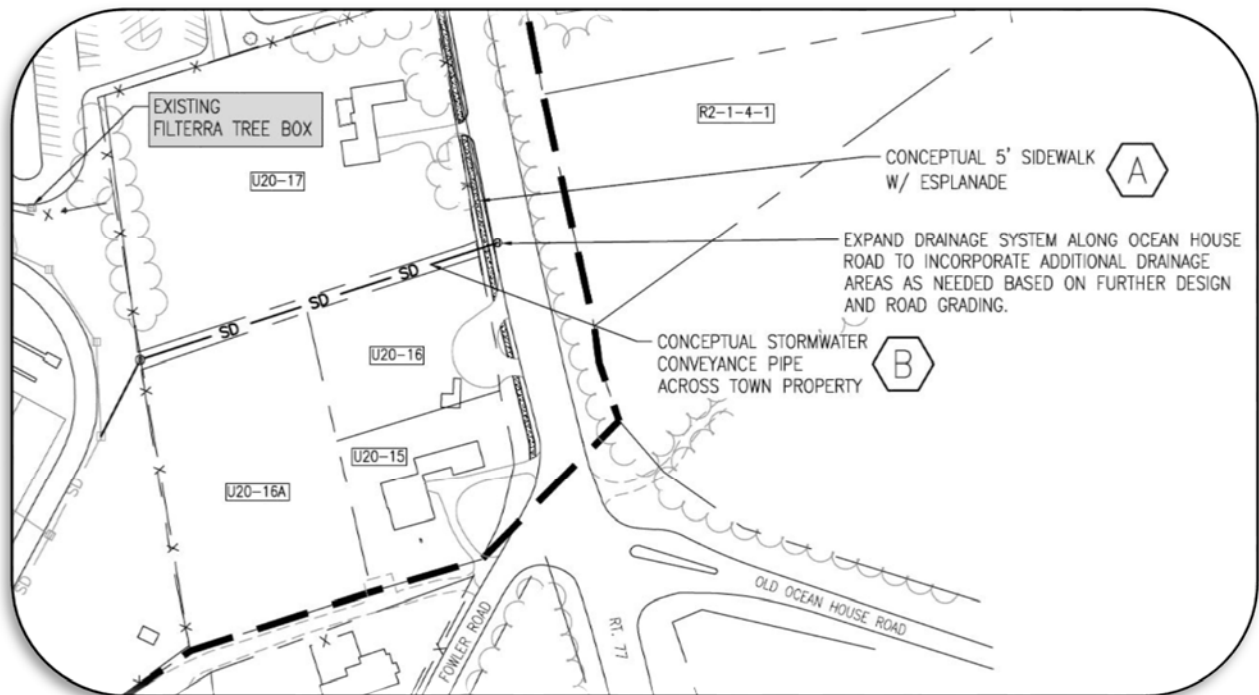
Some locations, such as Ocean House Road along the Pond Cover Shopping Center, have limited space for a sidewalk and esplanade. This may require grading of the esplanade to maintain the current sheet flow of stormwater runoff to the west with limited opportunities to incorporate bioretention systems. Other locations may allow for small rain gardens and bioretention cells to be installed within the esplanade or available right of way adjacent to the sidewalk where appropriate to enhance the landscape and manage stormwater.



B. Stormwater Conveyance Across Town property (parcel U21-12) – esplanade connection

Description of Proposed Conceptual Stormwater Improvements

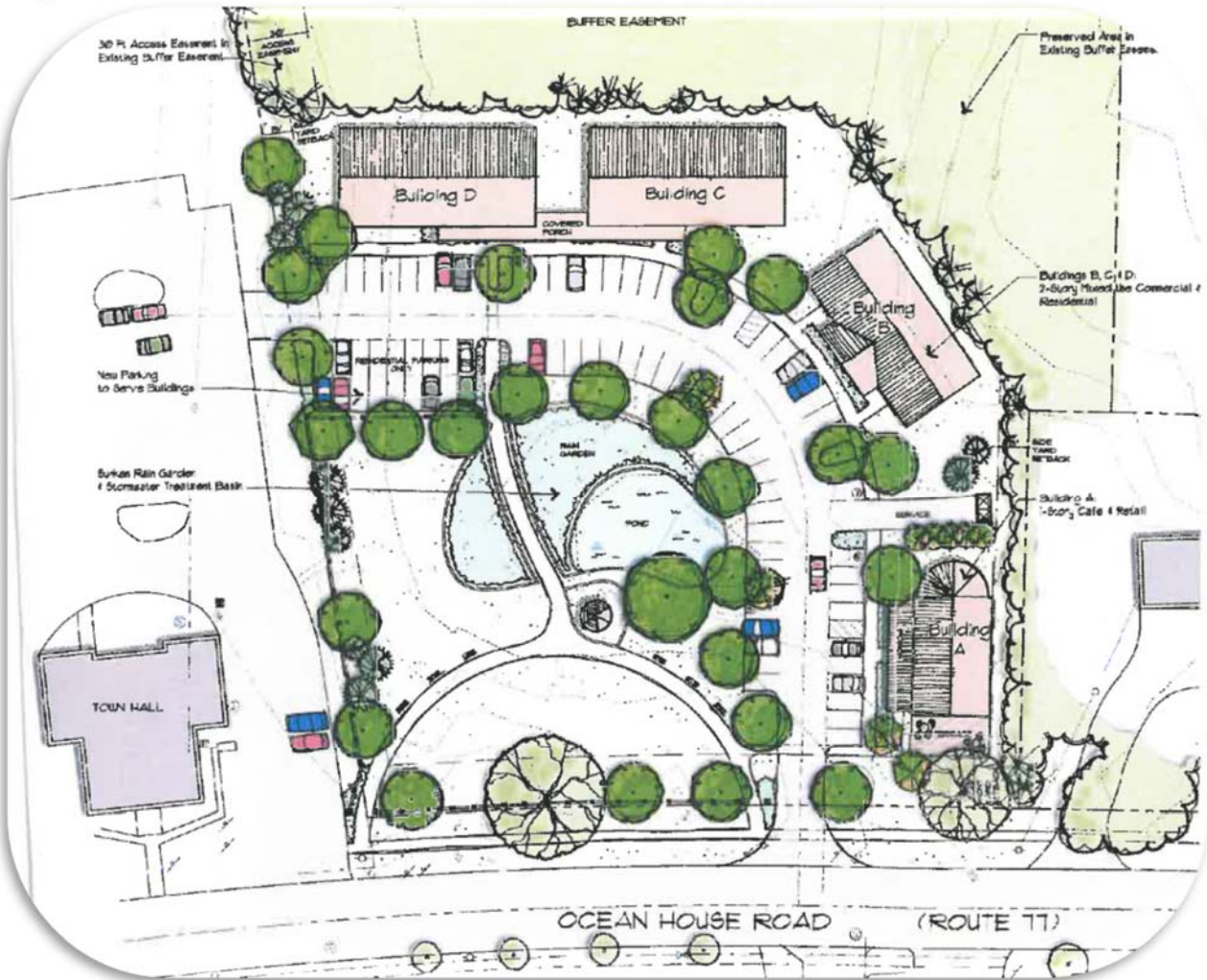
There is no drainage system along Ocean House Road just north of Fowler Road and proposed esplanade improvements along the west of Ocean House Road will likely require some road re-grading and stormwater conveyance. Currently, stormwater runoff flows overland via sheet flow across private properties to the west. The Town-owned parcel U21-12 has a narrow (20' wide) extension between private parcels up to Ocean House Road and can accommodate a stormwater connection from Ocean House Road to the existing drainage system along the track and soccer field for the High School. Depending on the final design for the esplanade along Ocean House Road and grading requirements, the drainage system along this portion of Ocean House Road could be expanded to the north and south. This requires further design and analysis of the capacity for the stormwater conveyance systems that discharge to Outfalls #7 and #8.



Description of Proposed Conceptual Stormwater Improvements

C. Village Green concept plan (parcel R2-1-4-6) – rain garden and bioretention cell

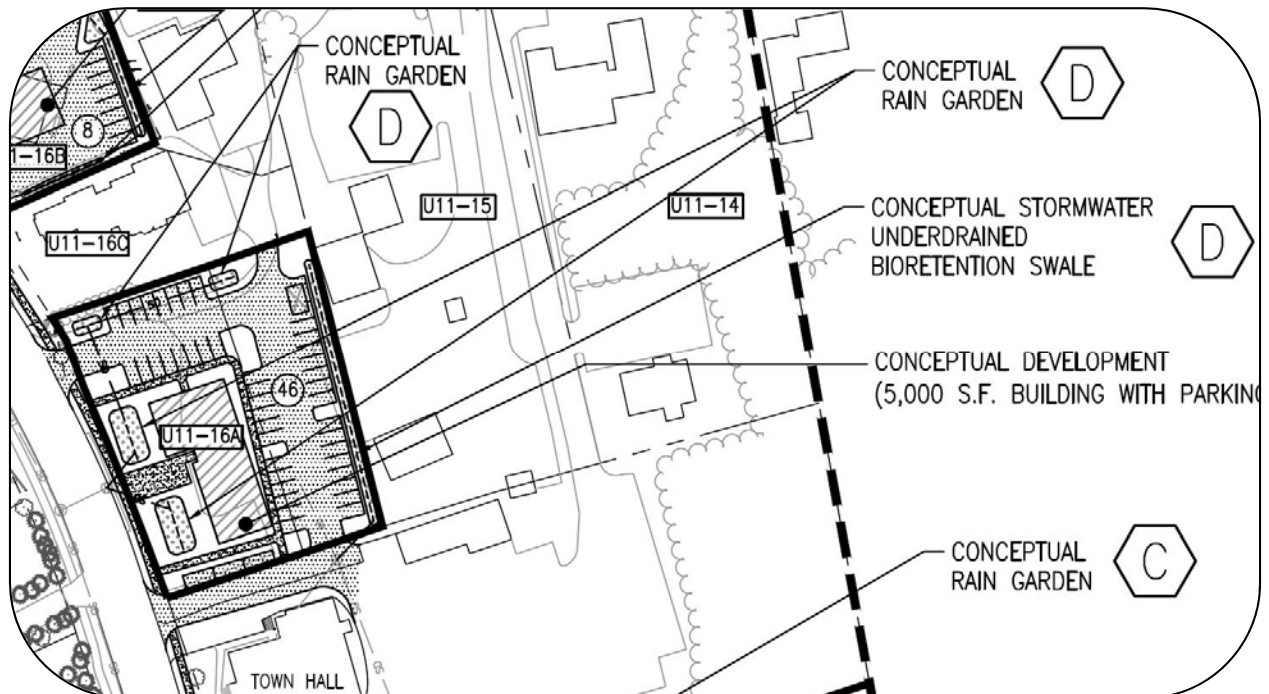
The below concept plan was provided to the Town Center Plan Committee for development of parcel R2-1-4-6 and provides an example of how the site can be developed to incorporate rain gardens and bioretention cells to manage stormwater on-site. Amec Foster Wheeler incorporated this general concept into the Conceptual Storm Drainage Improvement Plans with additional modifications. Rain gardens and bioretention cells were incorporated into the concept plan with underdrains that connect to the existing storm drain system in Ocean House Road. Due to the topography in this area, stormwater ultimately flows to the west and a conveyance for overflow needs to be provided across Ocean House Road. The storm drain system capacity in Ocean House Road to receive additional flow needs to be evaluated as part of the final design for the development of this parcel.



Description of Proposed Conceptual Stormwater Improvements

D. Private Development (parcel U11-16A) – rain gardens and underdrained bioretention swales

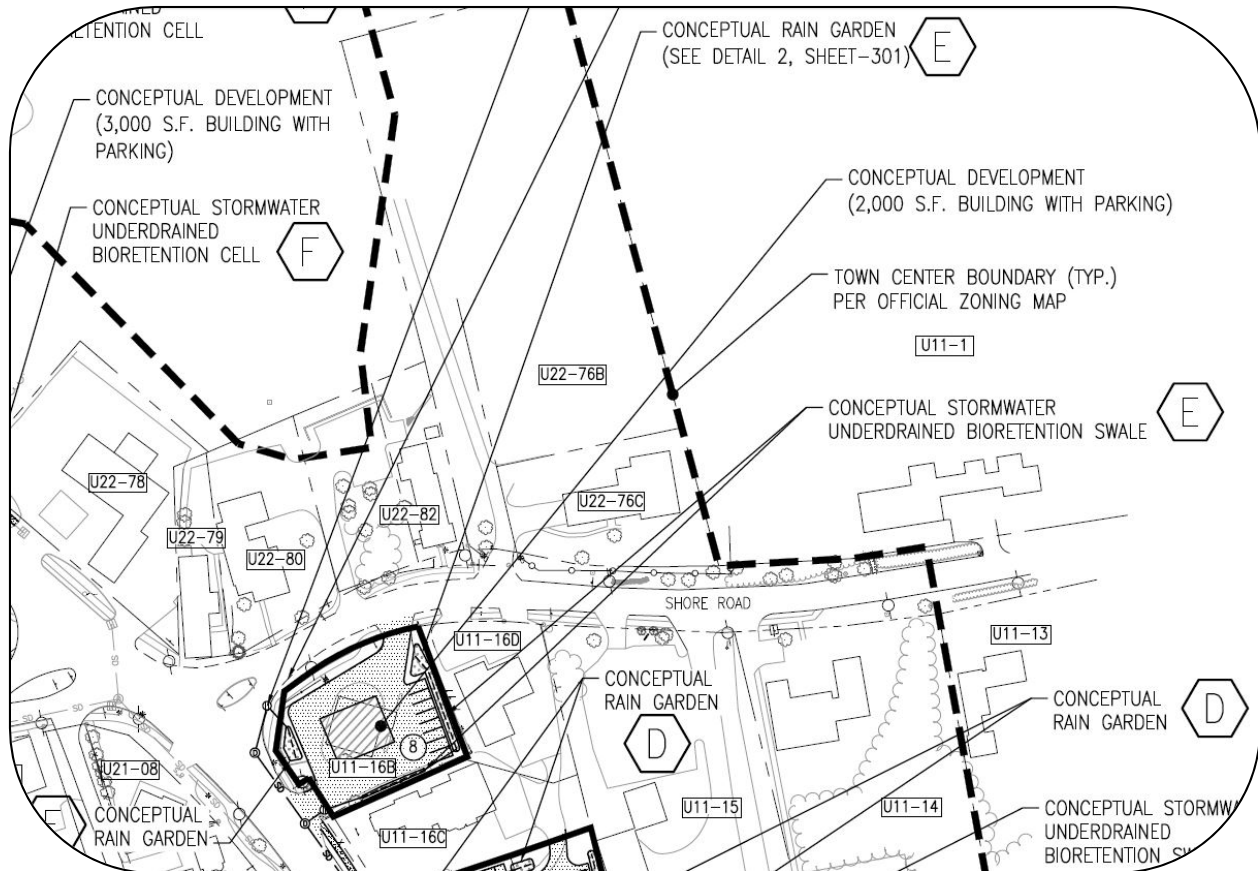
The concept plan for this parcel was developed to conform to the Town Center design standards for building and parking requirements (e.g., footprint, orientation and setbacks) with consideration of the topography and adjacent stormwater management systems. A combination of rain gardens and underdrained bioretention swales are proposed with overflows to the existing storm drain systems for the Town Hall and Ocean House Road. This is a general concept plan and is intended to illustrate how this parcel could be developed to incorporate the preferred stormwater management techniques for the Town Center.



Description of Proposed Conceptual Stormwater Improvements

E. Private Development (parcel U11-16B) – rain gardens and underdrained bioretention swales

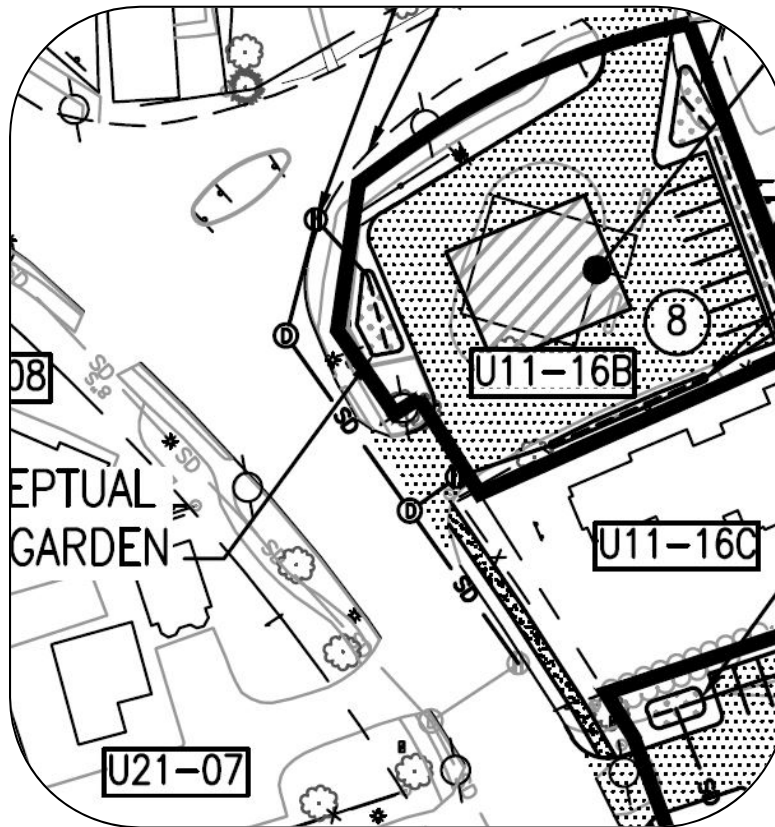
The concept plan for this parcel was developed to conform to the Town Center design standards for building and parking requirements (e.g., footprint, orientation and setbacks) in conjunction with the Town's planned improvements to the drainage at the intersection of Short Road and Ocean House Road (see Concept E-2). The concept plan consists of a rain garden and two underdrained bioretention swales adjacent to impervious surfaces that are connected to the new drainage structures in Ocean House Road. This is a general concept plan and is intended to illustrate how this parcel could be developed to incorporate the preferred stormwater management techniques for the Town Center.



Description of Proposed Conceptual Stormwater Improvements

E-2. Shore Road at Ocean House Road – catch basin for surface ponding

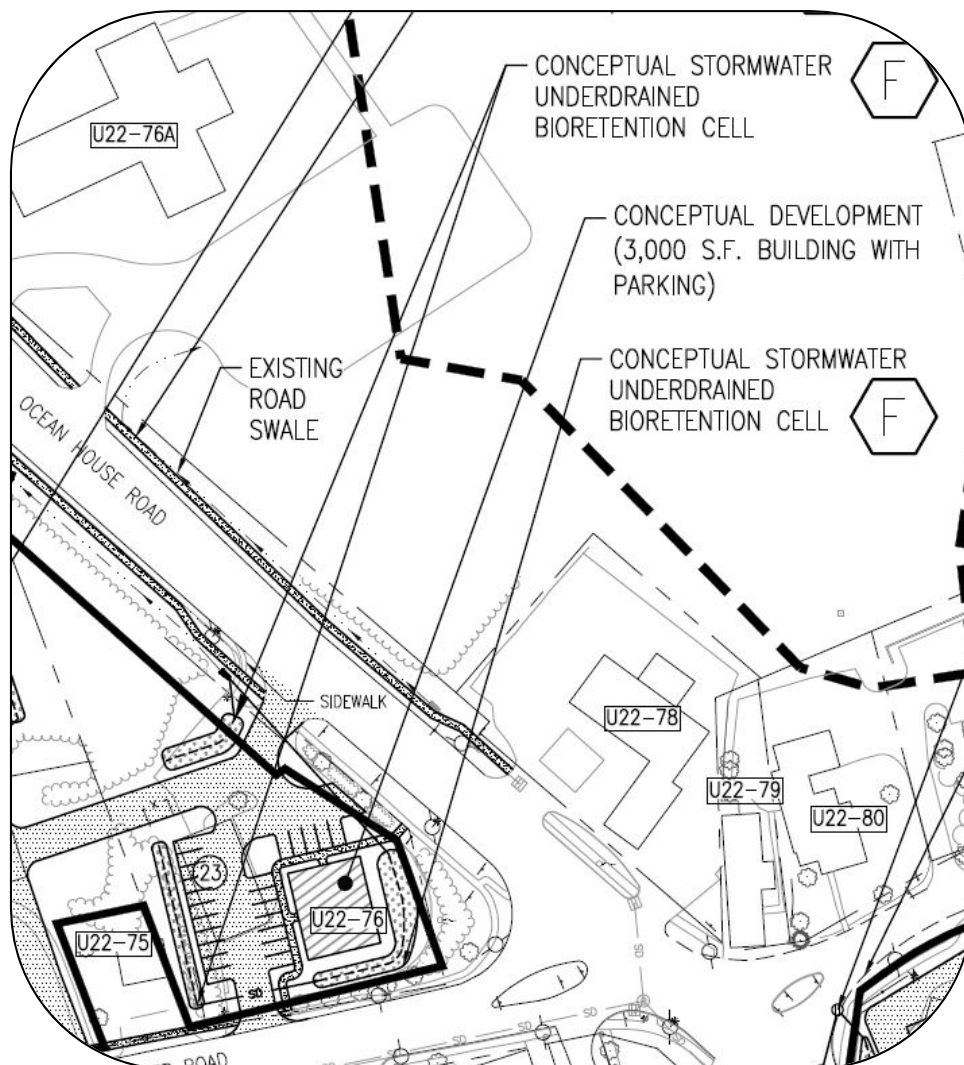
Due to the flat grade in this area and lack of nearby storm drain infrastructure, stormwater ponds on the road at this location. During the 2015 summer, the Town repaved this area and decreased the extent of surface ponding. The Town plans to monitor the area to assess the need for future drainage infrastructure improvements. If needed, the concept plan to address this issue includes the installation of a catch basin at the low lying area on Shore Road that is connected to two new manholes with piping to the existing catch basin adjacent to parcel U11-16C. This additional infrastructure in Ocean House Road also provides options for storm drain connections for the underdrains associated with stormwater BMPs on parcel U11-16B (refer to Concept E).



Description of Proposed Conceptual Stormwater Improvements

F. Private Development (parcel U22-76) – bioretention cells

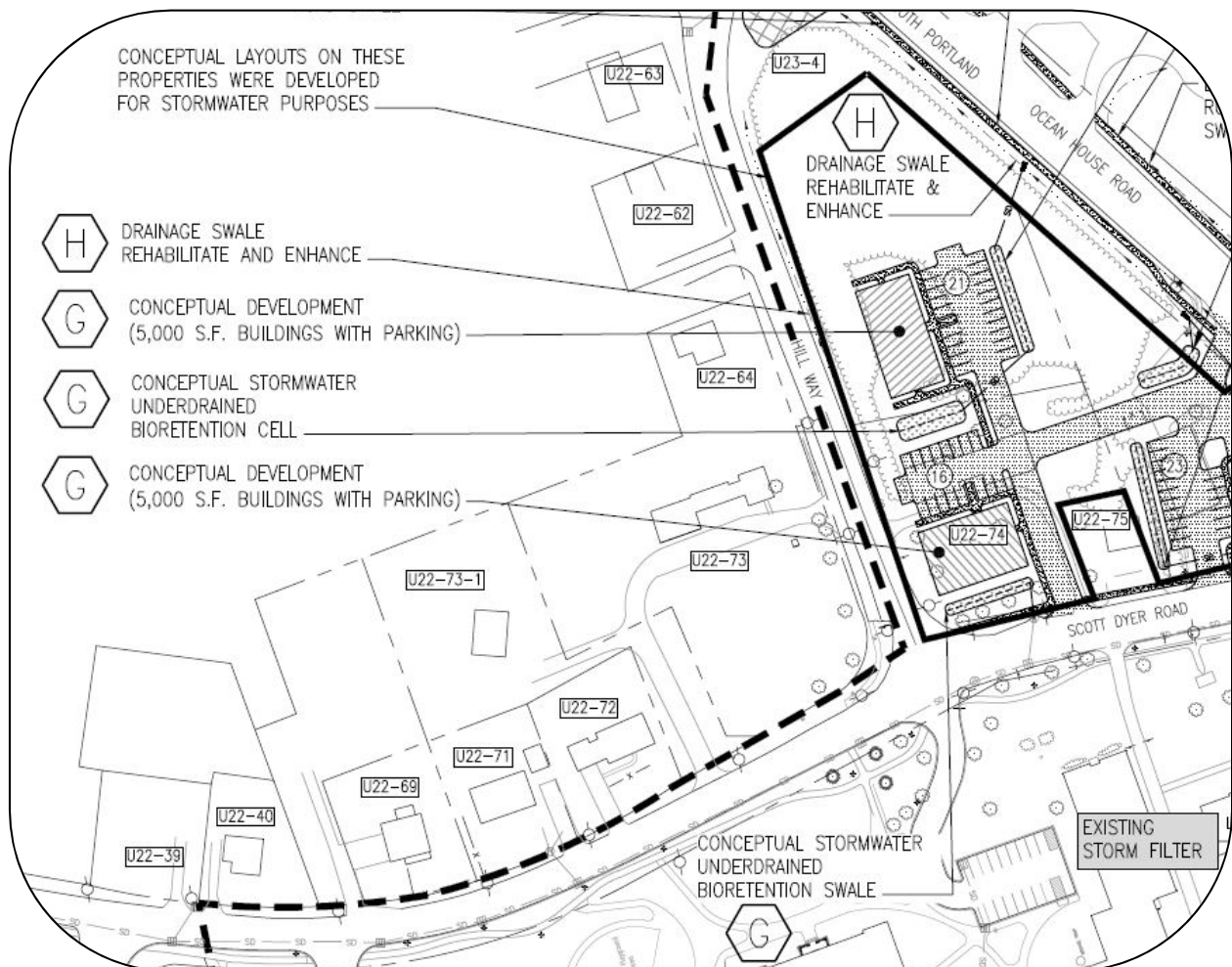
The concept plan for this parcel was developed to conform to the Town Center design standards for building and parking requirements (e.g., footprint, orientation and setbacks) with consideration of the stormwater management needs along Ocean House Road. The existing drainage system that receives runoff from this parcel consists of a swale that flows north and eventually into the catch basin on the Town-owned parcel U23-4. Improvements are proposed for this swale (see Concept H) to enhance this conveyance with the proposed esplanade and sidewalk. The concept plan for parcel U22-76 consists of underdrained bioretention cells adjacent to impervious surfaces with pipe connections between bioretention cells that eventually discharge to the enhanced drainage swale along Ocean House Road. This is a general concept plan and is intended to illustrate how this parcel could be developed to incorporate the preferred stormwater management techniques for the Town Center.



Description of Proposed Conceptual Stormwater Improvements

G. Private Development (parcel U22-74) – underdrained bioretention swales

The concept plan for this parcel was developed to conform to the Town Center design standards for building and parking requirements (e.g., footprint, orientation and setbacks) with consideration of the stormwater management needs along Hill Way and Ocean House Road. The existing drainage systems along Hill Way and Ocean House Road that receive runoff from this parcel consist of swales that flows north and eventually into the catch basin on the Town-owned parcel U23-4. Improvements are proposed for these swales (see Concept H) to enhance these conveyances with the proposed esplanade and sidewalk along Ocean House Road. The concept plan for parcel U22-74 consists of two underdrained bioretention cells and one underdrained bioretention swale adjacent to impervious surfaces. The bioretention swale discharges to the existing catch basin in Scott Dyer Road and the bioretention cells are connected and discharge to the enhanced swale along Ocean House Road. This is a general concept plan and is intended to illustrate how this parcel could be developed to incorporate the preferred stormwater management techniques for the Town Center.



Description of Proposed Conceptual Stormwater Improvements

H. Hill Way & Ocean House Road (parcel U23-4) – swale enhancements, snow storage area & pipe upgrades

The drainage swales along the east side of Hill Way and west side of Ocean House Road (north of Scott Dyer Road) need to be rehabilitated and enhanced. The existing swales are narrow and should be reconstructed with channel geometry to accommodate the anticipated stormwater flows in this area resulting from future redevelopment. These swales can be further enhanced with rock check dams (e.g., gabions) to reduce velocity/scour potential and provide for sediment removal. Due to the relatively steep relief and shallow bedrock in this area bioretention is not anticipated to be feasible and the primary stormwater management objective is conveyance and erosion control.

A designated snow storage area is proposed at the intersection of Hill Way and Ocean House Road based on the current snow management practices at this intersection. The snow storage area should be designed as a shallow grassy depression for debris and sediment to collect from melting snow with snow melt and stormwater discharge to the adjacent existing catch basin. According to the Cape Elizabeth DPW, the drainage system at this intersection is deteriorated and should be replaced in conjunction with other stormwater improvements. Further design is needed to evaluate whether this system needs to be upgraded (e.g., larger pipes) to accommodate and/or attenuate storm flows through the system and at the discharge point outside of the Town Center.

