DRAINAGE REPORT

For

McDonald's USA, LLC

PROPOSED

84 Macy Street
Amesbury, Massachusetts
Essex County

Prepared by:

BOHLER ENGINEERING
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900 TEL.

John A. Kucich
Massachusetts P.E. Lic. # 41530

September 12, 2016

BE #W162000

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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the re-development of a proposed "McDonald's" restaurant located at 84 Macy Street in the City of Amesbury, Massachusetts. The site, which contains approximately 1.51 acres of land, is situated on the northerly side of Macy Street and contains an existing "McDonald's" building, driveway, utilities and associated landscaping.

The proposed project includes razing and rebuilding of the "McDonald's" building, new paved parking areas, landscaping, storm water management components and associated utilities. This report addresses a comparative analysis of the pre- and post-development site runoff conditions. Additionally, this report provides calculations documenting the design of the proposed stormwater conveyance/management system as illustrated within the accompanying Site Development Plans prepared by Bohler Engineering. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site.

II. EXISTING SITE CONDITIONS

The site consists of approximately 1.51 acres of land located along the northerly side of Macy Street in the City of Amesbury, Massachusetts. Soils at the site are mapped as Udorthents & Unadilla very fine sandy loam which are classified by the Natural Resource Conservation Service (NRCS) as Hydrologic Soil Group "B". However, borings show a layer of interbedded clay at approximately 4' below grade, which is not conducive to infiltration. The majority site drains to a series of catch basins that outlet to an existing wetland system with limited treatment; a small portion of the site drains overland to the wetland area. A portion of the site along the parcel's frontage drains via sheet flow into the Right of Way. Slopes on the site range from 1%-40% with on-site elevations ranging from 39 adjacent to Main Street to 29 at the western property line.

For the purposes of this analysis, in order to provide a comparison of pre- and post-development drainage conditions, two (2) "design points" have been designated for the site, as follows:

Design Point #1 (DP-1) is the wetland system. Under existing conditions, this design point receives stormwater flows from approximately 1.41 acres of land, designated as watershed "E-1". This watershed includes areas of pavement, rooftop, landscaping and woodland.

Design Point #2 (DP-2) is the Right of Way. Under existing conditions, this design point receives stormwater flows from approximately 0.10 acres of land, designated as watershed "E-2". This watershed includes areas of pavement, concrete, and landscaping.

The pre-development peak rates of runoff associated with this property have been presented in Table 2.1 below (for additional information refer to the Appendices at the end of this report):

Table 2.1 – Pre-Development Runoff Rates to Design Points (cubic feet per second)

Design Point	2-Year Storm Event	10-Year Storm Event	25-Year Storm Event	100-Year Storm Event
Design Point #1	2.97	4.81	6.00	7.44
Design Point #2	0.23	0.44	0.58	0.75

III. PROPOSED SITE CONDITIONS

The proposed project consists of razing the existing building and associated site features as well as the construction of a new 4,690 SF freestanding "McDonald's" building including paved parking and loading areas, landscaping, associated utilities, and a new stormwater management system. The project will reduce impervious coverage on the site by 3,370 SF, which will reduce runoff rates and volumes while also increasing annual recharge volumes on the site.. The site, including the proposed parking areas, has been designed to drain to deep sump hooded catch basins. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to a stormwater quality unit. The water quality unit will provide pretreatment of stormwater runoff prior to discharge. The deep sump and hooded catch basins and the stormwater quality unit provide treatment that exceeds the required TSS removal for new developments. The design includes a site-specific Operation and Maintenance (O&M) Plan associated with the proposed drainage system.

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same Design Points described in Section II above. The post-development peak rates of runoff associated with this property have been presented in Table 3.1 below, which is less than the existing rates (for additional information refer to the Appendices at the end of this report):

Table 3.1 – Post-Development Runoff Rates to Design Points (cubic feet per second)

Design Point	2-Year Storm Event	10-Year Storm Event	25-Year Storm Event	100-Year Storm Event
Design Point #1	2.77	4.63	5.83	7.30
Design Point #2	0.13	0.28	0.38	0.51

The best management practices (BMPs) incorporated into the proposed stormwater management system have been designed to meet the total suspended solid (TSS) removal requirements as set forth in the Massachusetts Department of Environmental Protection Stormwater Handbook standards as required for redevelopments. In addition, a Stormwater Operation and Maintenance (O&M) Plan has been developed which includes scheduled pavement sweepings, and periodic inspections of stormwater management structures (i.e catch basins and water quality units).

IV. METHODOLOGY

Peak Flow Calculations

Methodology utilized to design the proposed stormwater management system includes compliance with the guidelines set forth in the latest edition of Massachusetts DEP Stormwater Handbook. The pre- and post-development runoff rates being discharged from the site were computed using the HydroCAD computer program. The drainage area and outlet information were entered into the program, which routes storm flows based on NRCS TR-20 and TR-55 methods. The other components of the model were determined following standard NRCS procedures for Curve Numbers (CNs) and times of concentrations documented in the appendices of this report. The following rainfall data was utilized in the calculations:

Frequency	2 year	10 year	25 year	100 year
Rainfall (inches)	3.10	4.50	5.40	6.50

The proposed stormwater management as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year design storm events. Additionally, the proposed project meets the MADEP Stormwater Management standards as they may be applicable to redevelopment projects. Compliance with these standards is described further below:

Standard #1: No New Untreated Discharges:

The project has been designed so that proposed impervious areas, including the building roof and paved parking/driveway areas are collected and passed through the proposed drainage system for treatment, exceeding the required TSS removal efficiency.

Standard 2: Peak Rate Attenuation

As outlined in Tables 2.1 and 3.1 above, the development of the site, and the proposed stormwater management system, have been designed so that post-development peak rates of runoff are below pre-development conditions for the 2-, 10-, 25- and 100-year storm events at the Design Point.

Standard 3: Recharge

The project is a redevelopment and is required to meet Standard 3 to the maximum extent practicable. The project will reduce the overall impervious surface on the site by approximately 3,370 square feet (5.1%). Therefore the annual recharge under post development conditions will exceed the annual recharge under predevelopment conditions. An underground infiltration system for roof runoff was considered, however, exiting soil conditions, as shown in the enclosed soil boring logs, are not conducive to infiltration.

Standard #4 Water Quality:

Water quality treatment is provided to the maximum extent practicable by utilizing a mix of deep sump catch basins and a water quality treatment unit. It is noted that the existing site drains to three (3) catch basins and provides minimal stormwater treatment. The proposed stormwater management system will

provide in excess of 80% TSS removal. TSS removal calculations are provided in the appendices of this report. The design includes a site-specific Operation and Maintenance (O&M) Plan associated with the proposed drainage system.

Standard #5 Land Uses with Higher Potential Pollutant Loads

The proposed project involves "Land Uses with Higher Potential Pollutant Loads". Accordingly the stormwater management system includes a proprietary oil-grit separator.

Standard 6: Critical Areas

Not Applicable for this project.

Standard 7: Redevelopment

As described the project is a redevelopment of an existing site. However, the project still exceeds the required TSS removal and complies with other requirements for new developments. The project has been designed to improve existing conditions by decreasing the overall impervious area by approximately 3,370 SF, incorporating deep sump catch basins and a stormwater quality unit for pretreatment of stormwater runoff prior to discharge. In addition, the overall peak rate of runoff has been designed to be below pre-development conditions as outlined in Tables 2.1 and 3.1.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

The proposed project will provide construction period erosion and sedimentation controls as indicated within the site plan set provided for this project. This includes a proposed construction entrance, protection for stormwater inlets, protection around temporary material stock piles and various other techniques as outlined on the erosion and sediment control sheets.

Standard 9: Operation and Maintenance (O&M) Plan

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included within this report. The O&M Plan outlines procedures and time tables for the long term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction, and periodic monitoring of the system components, in accordance with established

practices and the manufacturer's recommendations. The O&M Plan includes a list of responsible parties and an estimated budget for inspections and maintenance.

Standard 10: Prohibition of Illicit Discharges

The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensates, etc.) and will not contain any illicit discharges from prohibited sources. An Illicit Discharge Statement is included in the Appendices of this report.

V. SUMMARY

In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler Engineering results in a reduction in peak rates of runoff from the subject site when compared to pre-development conditions for the 2-, 10-, 25- and 100-year storm frequencies. In addition, the proposed best management practices will result in an effective removal of total suspended solids from the post-development runoff. The pre-development versus post-development peak discharge rates comparisons are contained within Tables 5.1 & 5.2 below. Finally, the project provides additional groundwater recharge through the reduction of 3,370 SF of existing impervious surfaces.

Table 5.1 – Runoff Rates to Design Point #1 – Wetland System (cubic feet per second)

Frequency (yrs)	Existing Flow	Proposed Flow	Change in Flow
2	2.97	2.77	-0.20 (6.7%)
10	4.81	4.63	-0.18 (3.7%)
25	6.00	5.83	-0.17 (2.8%)
100	7.44	7.30	-0.14 (1.9%)

Table 5.2 – Runoff Rates to Design Point #2 – Right of Way (cubic feet per second)

Frequency (yrs)	Existing Flow	Proposed Flow	Change in Flow
2	0.23	0.13	-0.10 (43.4%)
10	0.44	0.28	-0.16 (36.6%)
25	0.58	0.38	-0.20 (34.5%)
100	0.75	0.51	-0.24 (32.0%)

APPENDIX A – PROJECT MAPS & SOIL DATA

- USGS MAP
- FEMA FIRM MAP
- NRCS SOILS MAPS
- Soil Borings

PROJECT:W162000

USGS MAP

FOR

McDonald's

84 MACY STREET
CITY OF AMESBURY
ESSEX COUNTY
MASSACHUSETTS

SCALE: 1"=1,000'

BOHLER™
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- NORTHERN VIRGINIA
- CENTRAL VIRGINIA
- RALEIGH, NC
- CHARLOTTE, NC
- TAMPA, FL
- SOUTH FLORIDA

THE INFORMATION, DESIGN AND CONTENT OF THIS PLAN ARE PROPRIETARY AND SHALL NOT BE COPIED OR USED FOR ANY PURPOSE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM BOHLER ENGINEERING. ONLY APPROVED, SIGNED AND SEALED PLANS SHALL BE UTILIZED FOR CONSTRUCTION PURPOSES.
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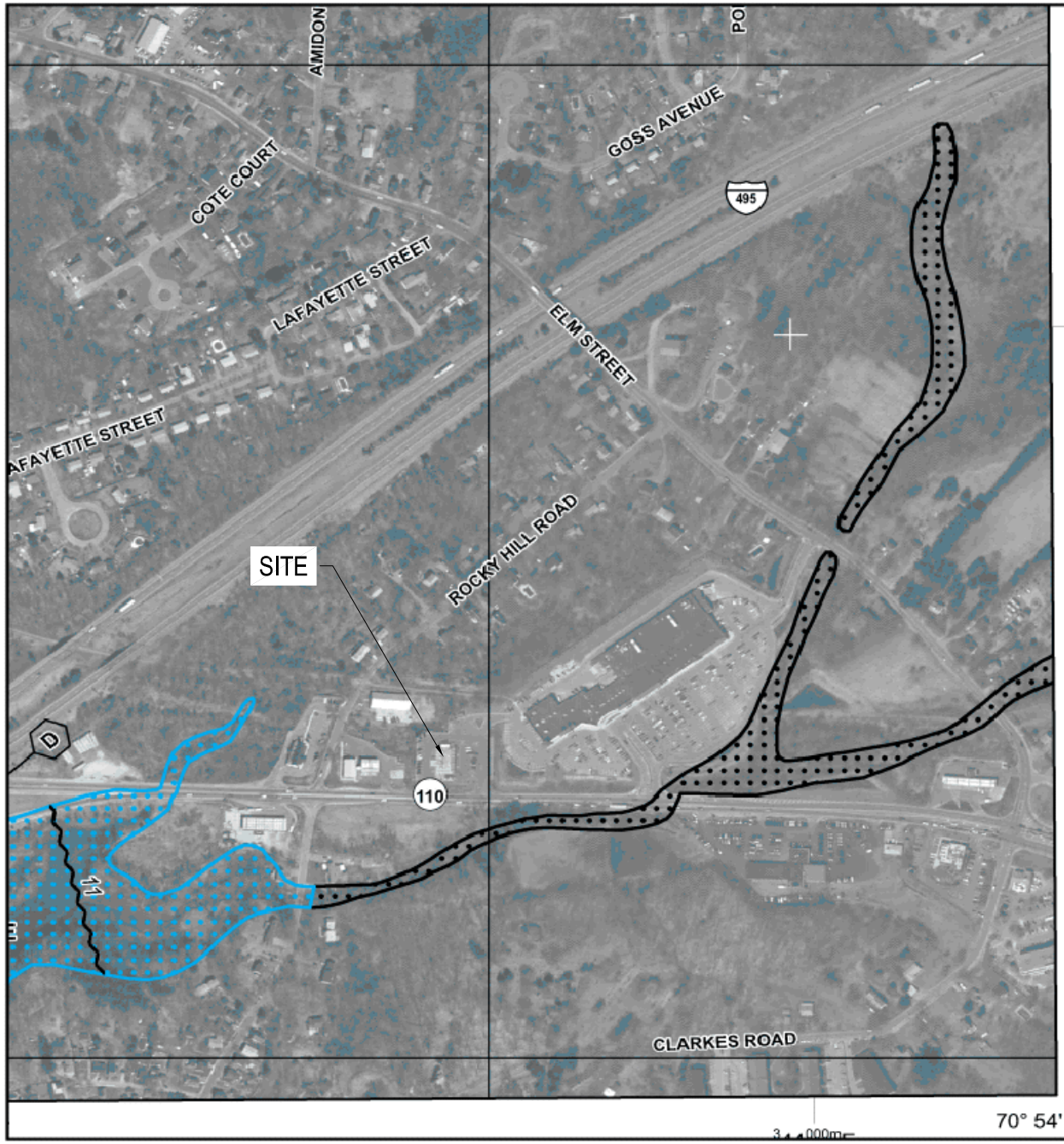


MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

PANEL 0106F

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

ESSEX COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 106 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AMESBURY, CITY OF	250075	0106	F
SALISBURY, TOWN OF	250103	0106	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

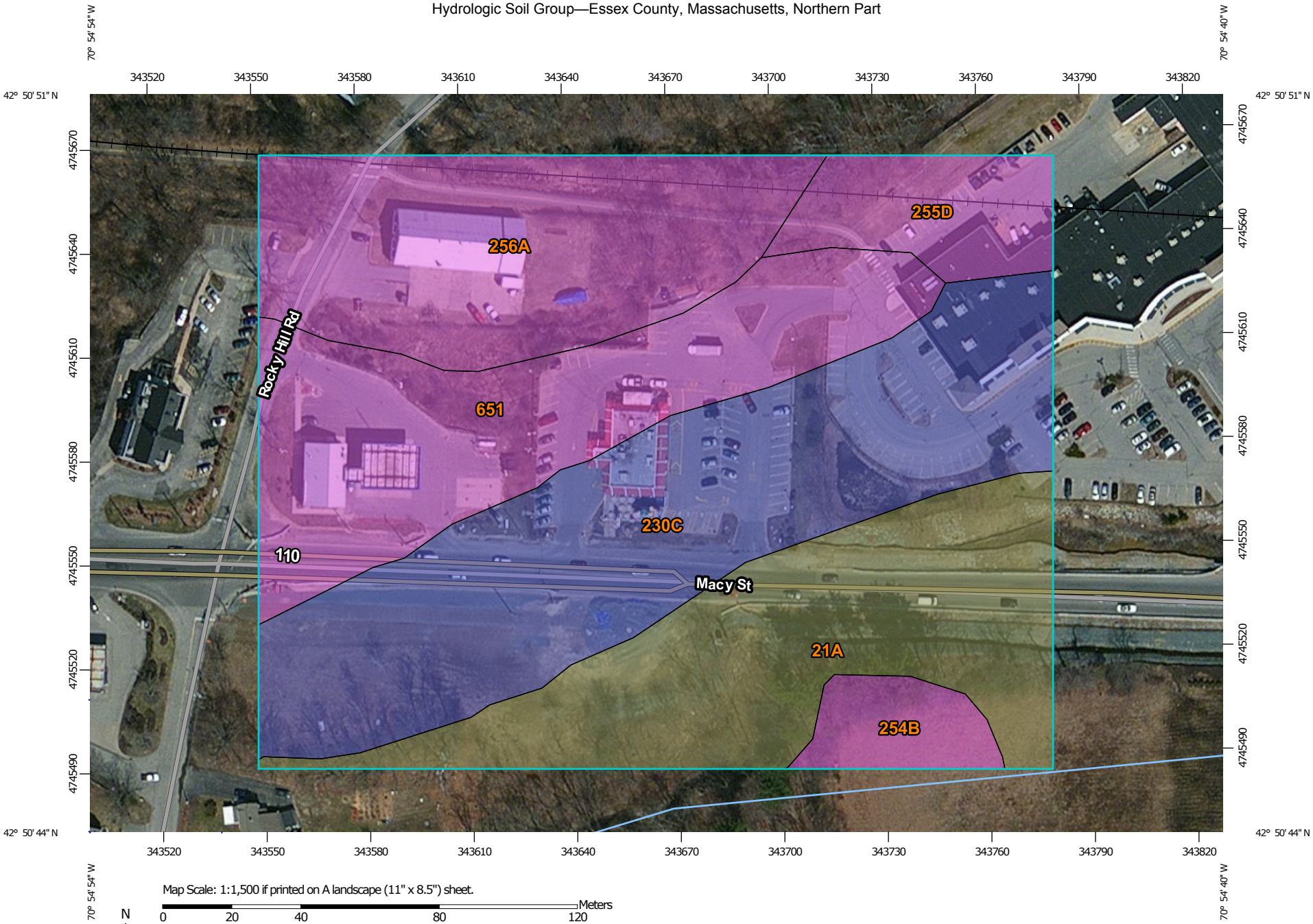
MAP NUMBER
25009C0106F

EFFECTIVE DATE
JULY 3, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Hydrologic Soil Group—Essex County, Massachusetts, Northern Part



Map Scale: 1:1,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 11, Sep 28, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—Apr 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Essex County, Massachusetts, Northern Part (MA605)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
21A	Walpole variant fine sandy loam, 0 to 3 percent slopes	C/D	2.1	21.1%
230C	Unadilla very fine sandy loam, 8 to 15 percent slopes	B	3.0	30.1%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	0.3	3.2%
255D	Windsor loamy sand, 15 to 25 percent slopes	A	0.6	5.7%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	2.0	19.5%
651	Udorthents, smoothed	A	2.1	20.4%
Totals for Area of Interest			**10.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

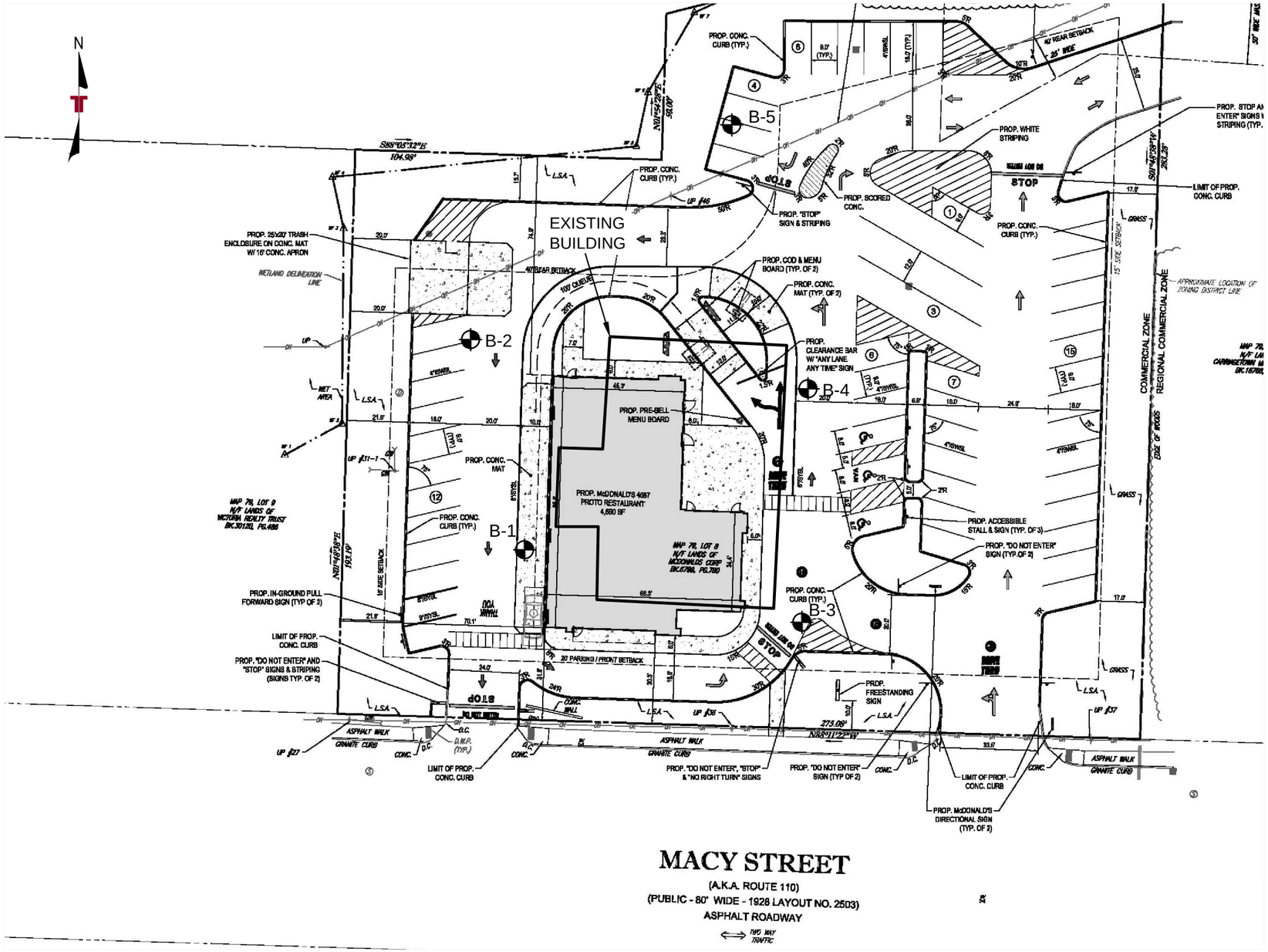
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher



NOTES:

1. THIS EXHIBIT WAS PREPARED FROM A DRAWING TITLED: CONCEPT PLAN 'B-3' PREPARED BY BOHLER ENGINEERING OF SOUTHBOROUGH, MA.

2. TEST BORINGS SHOWN WERE ADVANCED ON AUGUST 5, 2016 UNDER THE DIRECTION OF TERRACON WITH EQUIPMENT OWNED AND OPERATED BY DRILEX OF WEST BOYLSTON, MA.

3. THE TEST BORINGS WERE LOCATED BY LINE OF SIGHT BASED ON SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

4. USE OF THIS EXHIBIT IS LIMITED TO THE APPROXIMATE LOCATION OF THE TEST BORINGS AND OTHER PERTINENT SITE FEATURES. OTHER USE OF THIS EXHIBIT WITHOUT PERMISSION FROM TERRACON IS PROHIBITED.

LEGEND

B-1 APPROXIMATE TEST BORING LOCATION

40 0 20 40 80

GRAPHIC SCALE IN FEET

Prepared For: McDonald's USA	Project Mngr: LJD Drawn By: MCR Checked By: LJD Approved By: LJD	Project No. J1165112 Scale: As shown File No. J1165112.dwg Date: August 2016	Terracon 77 Sundial Avenue, Suite 401W Manchester, NH 03103 PH. (603)647-9700 Fax. (603)647-4432	EXPLORATION LOCATION PLAN McDONALD'S RESTAURANT 84 MACY STREET AMESBURY, MASSACHUSETTS	EXHIBIT A-2

Field Exploration Description

Terracon coordinated the advancement of five test borings (B-1 through B-5) on August 5, 2016. Test borings were advanced by Drilex Environmental of West Boylston, Massachusetts using a CME-75 drill rig using 3-inch inside diameter continuous-flight hollow-stem augers (HSA). Borings were drilled to depths ranging from 9 to 24 feet below ground surface at the approximate locations shown on the attached Exploration Location Plan (Exhibit A-2).

Standard Penetration Tests (SPTs) were performed in general accordance with industry standards. Density of soil samples is based on N-value, which is determined by adding the number of hammer blows required to drive the sampler from 6 to 18 inches.

An automatic SPT hammer was used to advance the split-barrel sampler. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Field logs of the borings were prepared by a Terracon representative. The logs included visual classifications of the materials encountered during drilling operations. Final exploration logs included with this report represent further interpretation by the geotechnical engineer of the field logs and were incorporated, where appropriate.

The approximate exploration locations are shown on Exhibit A-2 and were located by tape measurement and/or hand-held GPS and referencing on-site landmarks; the boring locations were pre-marked by others prior to mobilization and drilling. The location of the explorations should be considered accurate only to the degree implied by the method used to define them.

BORING LOG NO. B-1

PROJECT: McDonald's Restaurant

CLIENT: McDonald's USA

SITE: 84 Macy Street
Amesbury, Massachusetts

LOCATION See Exhibit A-2

Latitude: 42.846762° Longitude: -70.913499°

Approximate Surface Elev: 39 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS
0.4	38.5+/-			
5-inches of asphalt				
FILL - POORLY GRADED SAND WITH SILT, trace gravel, brown, medium dense			20	5-9-12-18 N=21
			16	10-21-16-8 N=37
4.0	35+/-			
INTERBEDDED CLAY WITH SAND (CL) AND LEAN CLAY (CL), gray, medium stiff to stiff		5		
			10	1-2-2-3 N=4
			24	1-2-2-1 N=4
		10		
			0	3-5-6-3 N=11
15.0	24+/-			
SANDY CLAY (CL), trace gravel, gray, stiff to hard		15		
			22	3-5-5-5 N=10
		20		
			4	12-15-19-16 N=34
22.0	17+/-			
Boring Terminated at 22 Feet				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6-inch hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings and patched upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
77 Sundial Ave Ste 401W
Manchester, NH

Boring Started: 8/5/2016 | Boring Completed: 8/5/2016
Drill Rig: CME-75 | Driller: Drilex/Chris
Project No.: J1165112 | Exhibit: A-4

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1165112.GPJ

BORING LOG NO. B-2

PROJECT: McDonald's Restaurant

CLIENT: McDonald's USA

SITE: 84 Macy Street
Amesbury, Massachusetts

LOCATION See Exhibit A-2

Latitude: 42.846952° Longitude: -70.913577°

Approximate Surface Elev: 36 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS
0.4	35.5+/-	5-inches of asphalt		
		FILL - SILTY SAND WITH GRAVEL, brown, medium dense	12	10-7-6-4 N=13
			8	7-8-8-7 N=16
			0	8-8-2-17 N=10
			19	15-12-17-16 N=29
10.0	26+/-			
		CLAY WITH SAND (CL), gray, medium stiff	22	5-3-3-2 N=6
15.0	21+/-			
		LEAN CLAY (CL), gray, very soft	24	1-woh/12"-1
20.0	16+/-			
		SANDY CLAY (CL), trace gravel, gray, very stiff	20	6-6-7-9 N=13
22.0	14+/-			
		Boring Terminated at 22 Feet		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6-inch hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings and patched upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
77 Sundial Ave Ste 401W
Manchester, NH

Boring Started: 8/5/2016 | Boring Completed: 8/5/2016
Drill Rig: CME-75 | Driller: Drilex/Chris
Project No.: J1165112 | Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1165112.GPJ

BORING LOG NO. B-3

PROJECT: McDonald's Restaurant

CLIENT: McDonald's USA

SITE: 84 Macy Street
Amesbury, Massachusetts

LOCATION See Exhibit A-2

Latitude: 42.846692° Longitude: -70.913132°

Approximate Surface Elev: 40 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION	RECOVERY (In.)	FIELD TEST RESULTS
0.4	39.5+/-	**4.5-inches of asphalt**		
		FILL - SILTY SAND WITH GRAVEL, brown, medium dense	20	8-10-15-9 N=25
2.0	38+/-			
		CLAY WITH SAND (CL), gray, very stiff	6	12-7-10-6 N=17
5.0	35+/-			
		LEAN CLAY (CL), gray, soft to stiff	24	1-2-2-3 N=4
			24	3-4-4-4 N=8
			24	woh/6"-1-1-2 N=2
		Cobbles at 13.5 feet		
15.0	25+/-			
		SANDY CLAY (CL), gray, very stiff	12	4-6-9-10 N=15
			12	2-9-10-9 N=19
22.0	18+/-			
		Boring Terminated at 22 Feet		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6-inch hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings and patched upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
77 Sundial Ave Ste 401W
Manchester, NH

Boring Started: 8/5/2016	Boring Completed: 8/5/2016
Drill Rig: CME-75	Driller: Drilex/Chris
Project No.: J1165112	Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1165112.GPJ

BORING LOG NO. B-4

PROJECT: McDonald's Restaurant

CLIENT: McDonald's USA

**SITE: 84 Macy Street
Amesbury, Massachusetts**

LOCATION See Exhibit A-2

Latitude: 42.846909° Longitude: -70.913139°

Approximate Surface Elev: 39 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
0.5	38.5+/-	6-inches of asphalt					
		FILL - SILTY SAND WITH GRAVEL, brown, dense				8	9-18-21-17 N=39
						8	18-12-10-10 N=22
		FILL - POORLY GRADED SAND, trace silt, light brown, with gray clayey sand clumps, medium dense	5			18	3-8-7-7 N=15
		FILL - SILTY SAND, trace gravel, gray-brown, dense				16	12-23-19-20 N=42
10.0	29+/-						
		SANDY CLAY (CL), gray, medium stiff	10			8	1-2-3-4 N=5
15.0	24+/-						
		LEAN CLAY (CL), gray, very soft	15	▽		24	woh/24"
			20			24	woh/24"
		Pushed drill rod without sampling. Drill rod resistance at 24 feet					
24.0	15+/-						
		Boring Terminated at 24 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6-inch hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings and patched upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *15' WD*

Terracon
77 Sundial Ave Ste 401W
Manchester, NH

Boring Started: 8/5/2016 | Boring Completed: 8/5/2016
Drill Rig: CME-75 | Driller: Drilex/Chris
Project No.: J1165112 | Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1165112.GPJ

BORING LOG NO. B-5

PROJECT: McDonald's Restaurant

CLIENT: McDonald's USA

SITE: 84 Macy Street
Amesbury, Massachusetts

LOCATION See Exhibit A-2

Latitude: 42.847166° Longitude: -70.913239°

Approximate Surface Elev: 37 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
0.5	36.5+/-					
FILL - POORLY GRADED SAND WITH SILT, trace gravel, brown, medium dense					18	9-9-8-8 N=17
					12	9-6-5-4 N=11
FILL - SILTY SAND, gray, loose to medium dense		5			10	1-2-2-1 N=4
7.5	29.5+/-					
SANDY CLAY (CL), gray, soft					12	woh/6"-1-1-1 N=2
9.0	28+/-					
Boring Terminated at 9 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6-inch hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings and patched upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

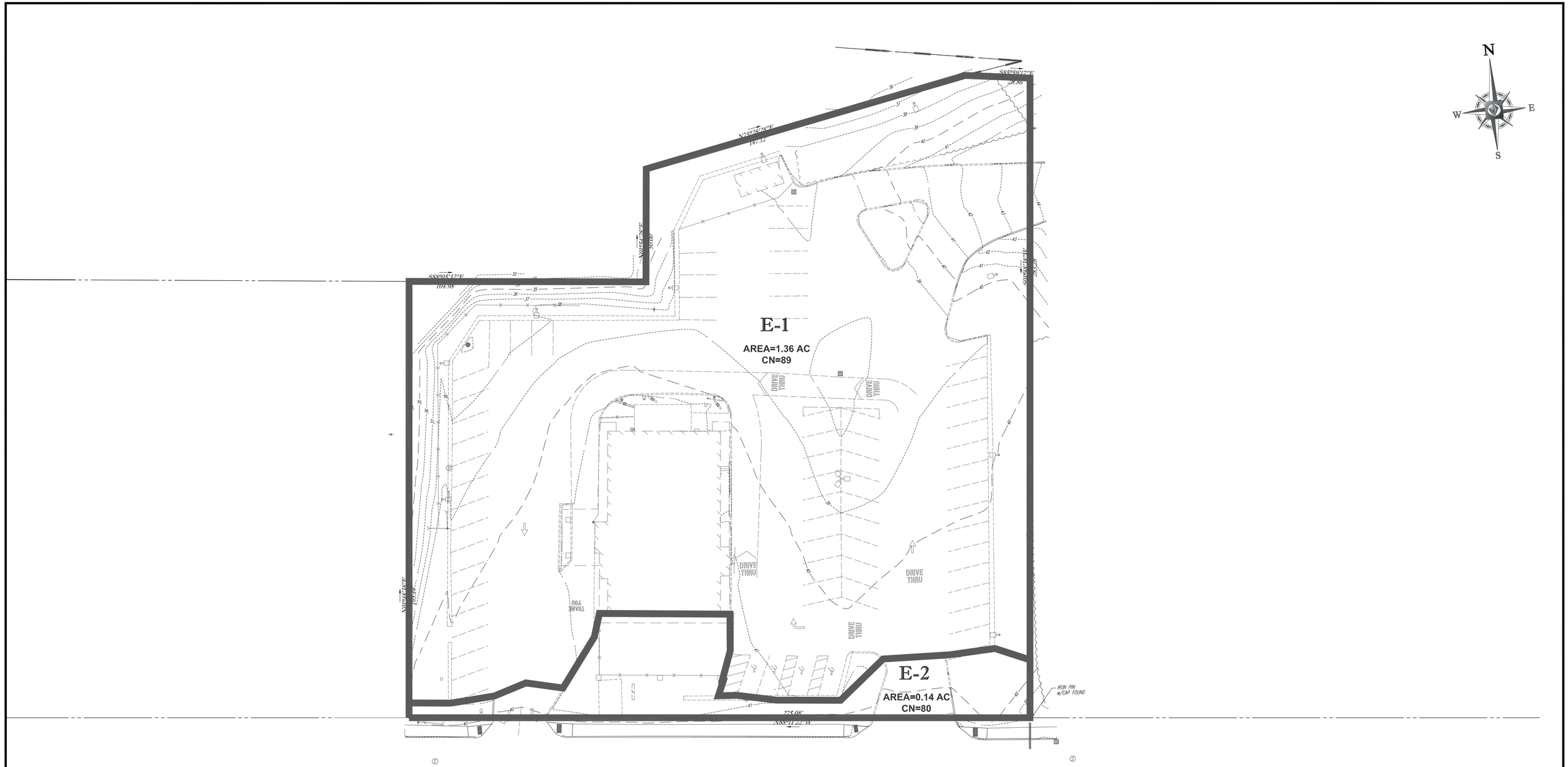
Terracon
77 Sundial Ave Ste 401W
Manchester, NH

Boring Started: 8/5/2016 | Boring Completed: 8/5/2016
Drill Rig: CME-75 | Driller: Drilex/Chris
Project No.: J1165112 | Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL J1165112.GPJ

APPENDIX B – PRE-DEVELOPMENT DRAINAGE ANALYSIS

- EXISTING DRAINAGE TRIBUTARY MAP
- EXISTING CONDITION DRAINAGE REPORT

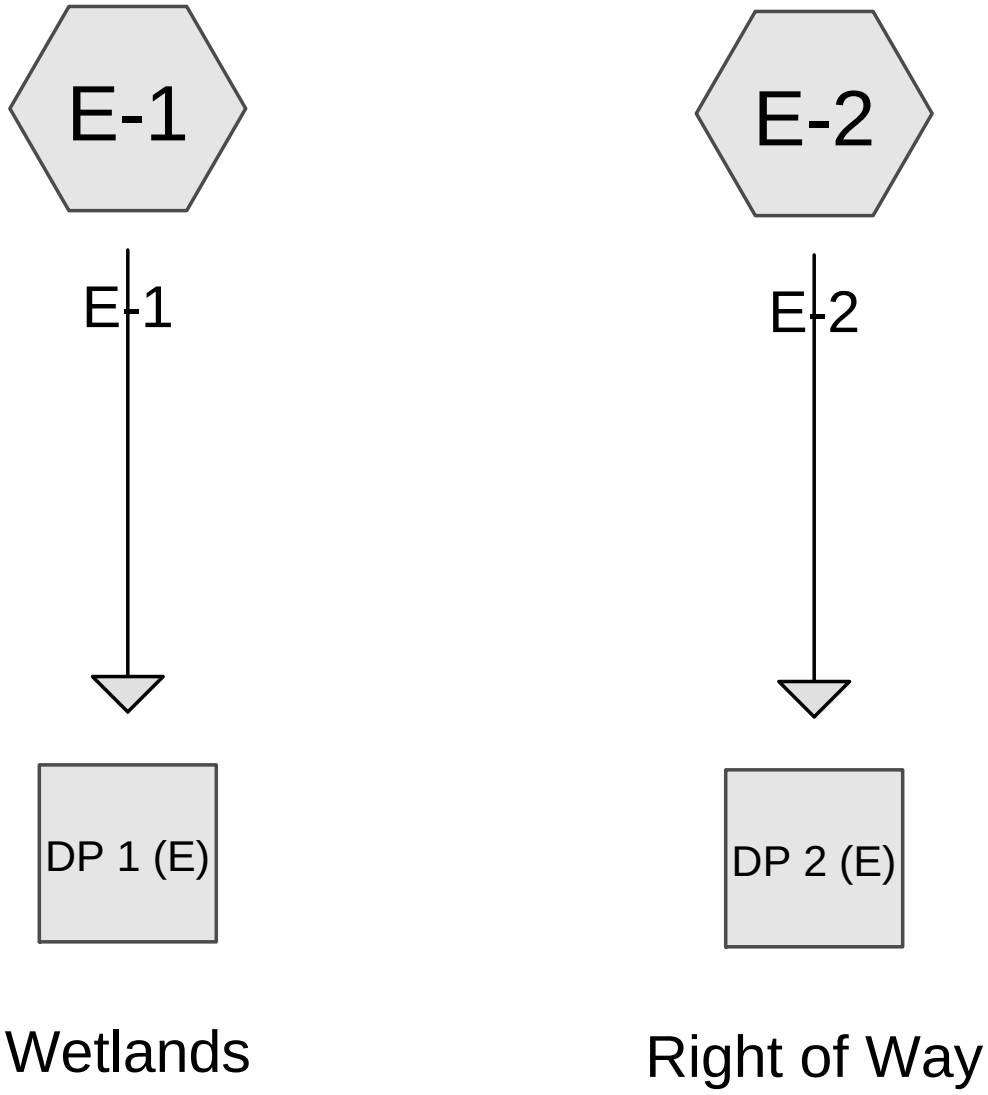


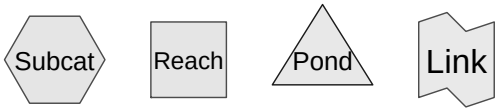
EXISTING DRAINAGE TRIBUTARY MAP

NOT TO SCALE

PREPARED BY

BOHLER ENGINEERING





Routing Diagram for W162000
Prepared by Bohler Engineering, Printed 9/2/2016
HydroCAD® 10.00 s/n 08311 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment E-1: E-1

Runoff = 2.97 cfs @ 12.10 hrs, Volume= 0.226 af, Depth> 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 2 Yr Rainfall=3.10"

Area (ac)	CN	Description
1.029	98	Paved parking, HSG B
0.336	61	>75% Grass cover, Good, HSG B
1.365	89	Weighted Average
0.336		24.62% Pervious Area
1.029		75.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment E-2: E-2

Runoff = 0.23 cfs @ 12.01 hrs, Volume= 0.016 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 2 Yr Rainfall=3.10"

Area (ac)	CN	Description
0.073	98	Paved parking, HSG B
0.071	61	>75% Grass cover, Good, HSG B
0.144	80	Weighted Average
0.071		49.31% Pervious Area
0.073		50.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, 6**

Summary for Reach DP 1 (E): Wetlands

Inflow Area = 1.365 ac, 75.38% Impervious, Inflow Depth > 1.99" for 2 Yr event
Inflow = 2.97 cfs @ 12.10 hrs, Volume= 0.226 af
Outflow = 2.97 cfs @ 12.10 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (E): Right of Way

Inflow Area = 0.144 ac, 50.69% Impervious, Inflow Depth > 1.33" for 2 Yr event
Inflow = 0.23 cfs @ 12.01 hrs, Volume= 0.016 af
Outflow = 0.23 cfs @ 12.01 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment E-1: E-1

Runoff = 4.81 cfs @ 12.10 hrs, Volume= 0.375 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 10 Yr Rainfall=4.50"

Area (ac)	CN	Description
1.029	98	Paved parking, HSG B
0.336	61	>75% Grass cover, Good, HSG B
1.365	89	Weighted Average
0.336		24.62% Pervious Area
1.029		75.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment E-2: E-2

Runoff = 0.44 cfs @ 12.01 hrs, Volume= 0.030 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 10 Yr Rainfall=4.50"

Area (ac)	CN	Description
0.073	98	Paved parking, HSG B
0.071	61	>75% Grass cover, Good, HSG B
0.144	80	Weighted Average
0.071		49.31% Pervious Area
0.073		50.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, 6**

Summary for Reach DP 1 (E): Wetlands

Inflow Area = 1.365 ac, 75.38% Impervious, Inflow Depth > 3.29" for 10 Yr event
Inflow = 4.81 cfs @ 12.10 hrs, Volume= 0.375 af
Outflow = 4.81 cfs @ 12.10 hrs, Volume= 0.375 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (E): Right of Way

Inflow Area = 0.144 ac, 50.69% Impervious, Inflow Depth > 2.46" for 10 Yr event
Inflow = 0.44 cfs @ 12.01 hrs, Volume= 0.030 af
Outflow = 0.44 cfs @ 12.01 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment E-1: E-1

Runoff = 6.00 cfs @ 12.10 hrs, Volume= 0.473 af, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 25 Yr Rainfall=5.40"

Area (ac)	CN	Description
1.029	98	Paved parking, HSG B
0.336	61	>75% Grass cover, Good, HSG B
1.365	89	Weighted Average
0.336		24.62% Pervious Area
1.029		75.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment E-2: E-2

Runoff = 0.58 cfs @ 12.00 hrs, Volume= 0.039 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 25 Yr Rainfall=5.40"

Area (ac)	CN	Description
0.073	98	Paved parking, HSG B
0.071	61	>75% Grass cover, Good, HSG B
0.144	80	Weighted Average
0.071		49.31% Pervious Area
0.073		50.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, 6**

Summary for Reach DP 1 (E): Wetlands

Inflow Area = 1.365 ac, 75.38% Impervious, Inflow Depth > 4.15" for 25 Yr event
Inflow = 6.00 cfs @ 12.10 hrs, Volume= 0.473 af
Outflow = 6.00 cfs @ 12.10 hrs, Volume= 0.473 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (E): Right of Way

Inflow Area = 0.144 ac, 50.69% Impervious, Inflow Depth > 3.24" for 25 Yr event
Inflow = 0.58 cfs @ 12.00 hrs, Volume= 0.039 af
Outflow = 0.58 cfs @ 12.00 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment E-1: E-1

Runoff = 7.44 cfs @ 12.10 hrs, Volume= 0.594 af, Depth> 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 100 Yr Rainfall=6.50"

Area (ac)	CN	Description
1.029	98	Paved parking, HSG B
0.336	61	>75% Grass cover, Good, HSG B
1.365	89	Weighted Average
0.336		24.62% Pervious Area
1.029		75.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment E-2: E-2

Runoff = 0.75 cfs @ 12.00 hrs, Volume= 0.051 af, Depth> 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 100 Yr Rainfall=6.50"

Area (ac)	CN	Description
0.073	98	Paved parking, HSG B
0.071	61	>75% Grass cover, Good, HSG B
0.144	80	Weighted Average
0.071		49.31% Pervious Area
0.073		50.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, 6**

Summary for Reach DP 1 (E): Wetlands

Inflow Area = 1.365 ac, 75.38% Impervious, Inflow Depth > 5.22" for 100 Yr event
Inflow = 7.44 cfs @ 12.10 hrs, Volume= 0.594 af
Outflow = 7.44 cfs @ 12.10 hrs, Volume= 0.594 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

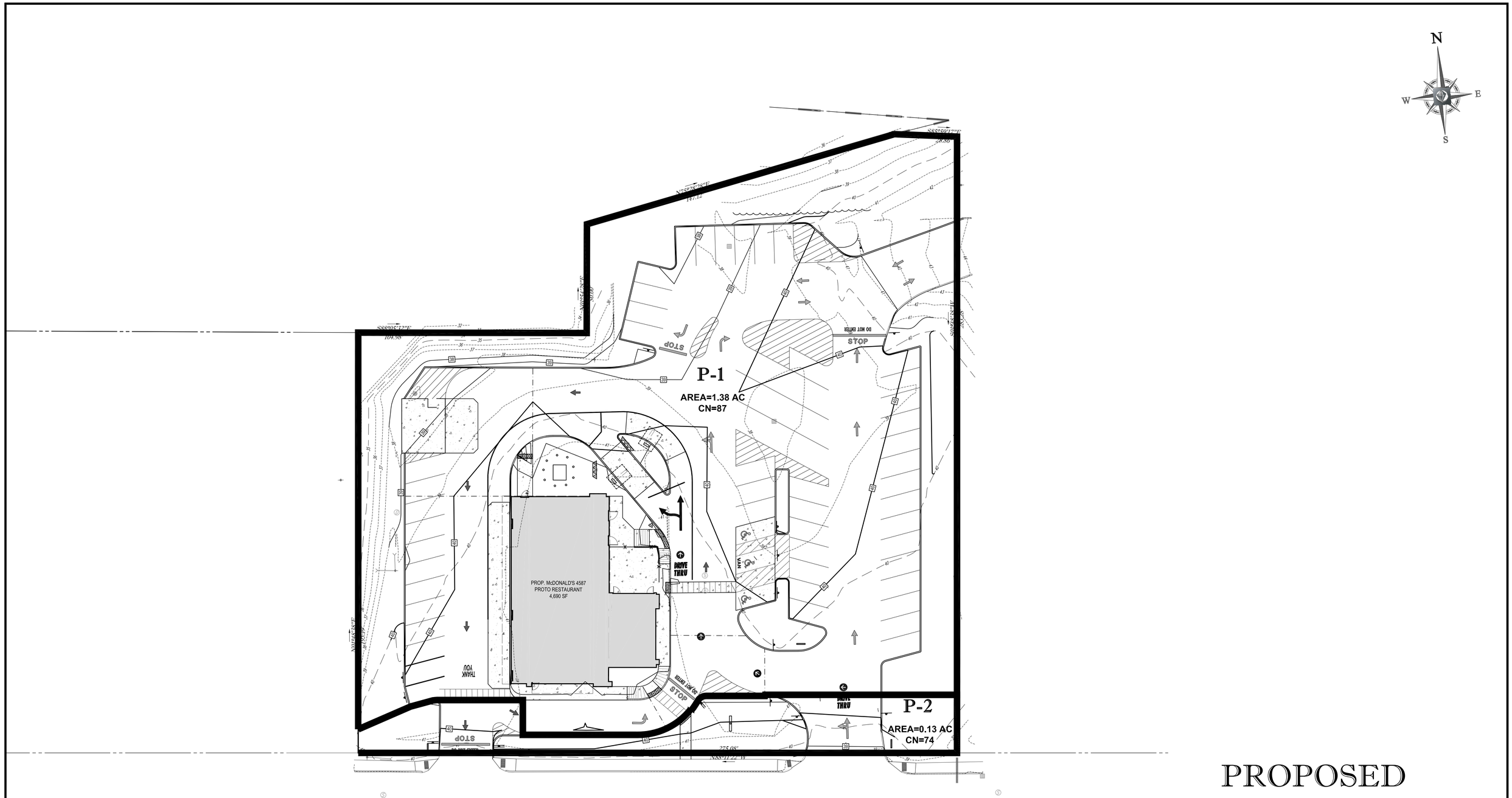
Summary for Reach DP 2 (E): Right of Way

Inflow Area = 0.144 ac, 50.69% Impervious, Inflow Depth > 4.24" for 100 Yr event
Inflow = 0.75 cfs @ 12.00 hrs, Volume= 0.051 af
Outflow = 0.75 cfs @ 12.00 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

APPENDIX C – POST DEVELOPMENT DRAINAGE ANALYSIS

- EXISTING DRAINAGE TRIBUTARY MAP
- EXISTING CONDITION DRAINAGE REPORT

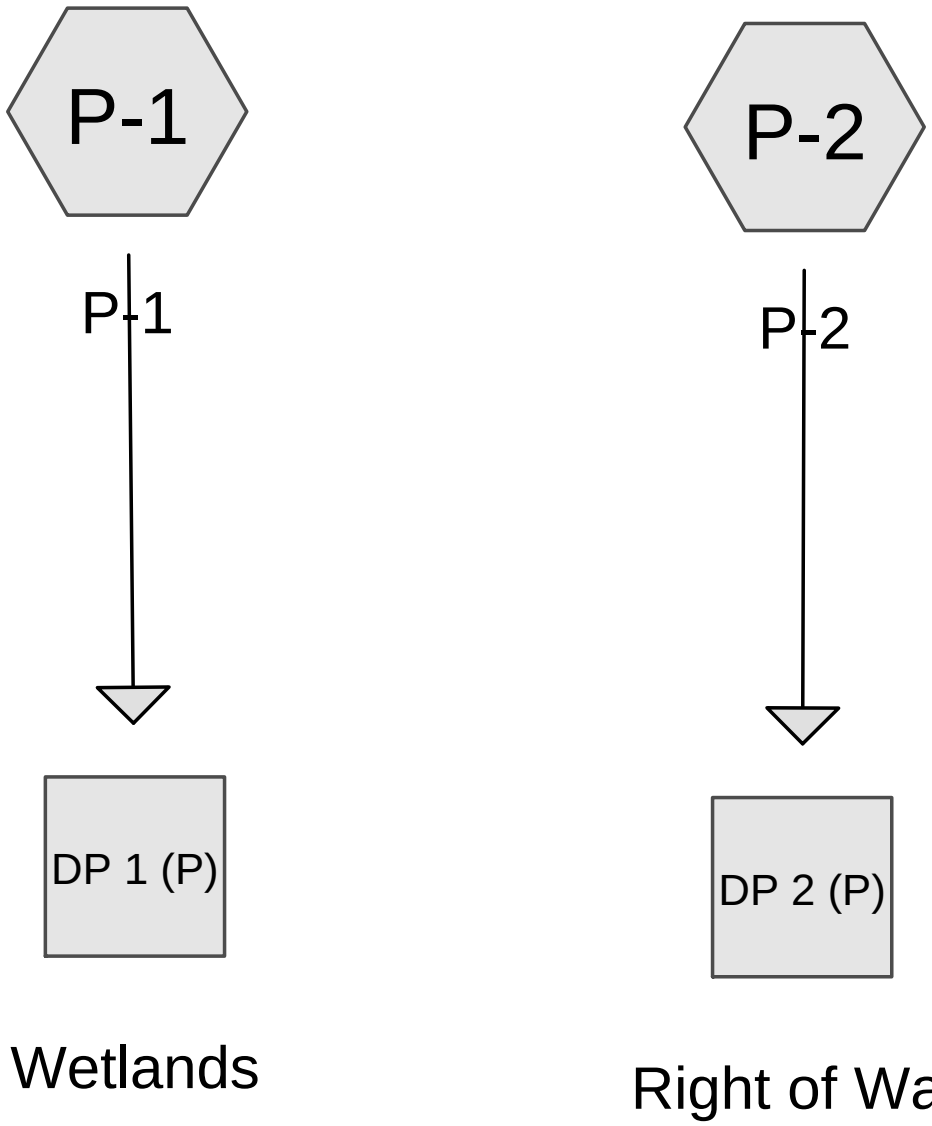


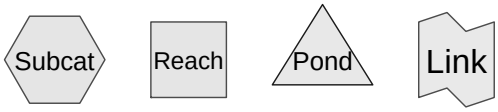
PROPOSED DRAINAGE TRIBUTARY MAP

NOT TO SCALE

PREPARED BY

BOHLER ENGINEERING





Routing Diagram for W162000
Prepared by Bohler Engineering, Printed 9/7/2016
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Summary for Subcatchment P-1: P-1

Runoff = 2.77 cfs @ 12.10 hrs, Volume= 0.210 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 2 Yr Rainfall=3.10"

Area (ac)	CN	Description
0.979	98	Paved parking, HSG B
0.401	61	>75% Grass cover, Good, HSG B
1.380	87	Weighted Average
0.401		29.06% Pervious Area
0.979		70.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment P-2: P-2

Runoff = 0.13 cfs @ 12.11 hrs, Volume= 0.010 af, Depth> 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 2 Yr Rainfall=3.10"

Area (ac)	CN	Description
0.045	98	Paved parking, HSG B
0.083	61	>75% Grass cover, Good, HSG B
0.128	74	Weighted Average
0.083		64.84% Pervious Area
0.045		35.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP 1 (P): Wetlands

Inflow Area = 1.380 ac, 70.94% Impervious, Inflow Depth > 1.83" for 2 Yr event
Inflow = 2.77 cfs @ 12.10 hrs, Volume= 0.210 af
Outflow = 2.77 cfs @ 12.10 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (P): Right of Way

Inflow Area = 0.128 ac, 35.16% Impervious, Inflow Depth > 0.97" for 2 Yr event
Inflow = 0.13 cfs @ 12.11 hrs, Volume= 0.010 af
Outflow = 0.13 cfs @ 12.11 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment P-1: P-1

Runoff = 4.63 cfs @ 12.10 hrs, Volume= 0.356 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 10 Yr Rainfall=4.50"

Area (ac)	CN	Description
0.979	98	Paved parking, HSG B
0.401	61	>75% Grass cover, Good, HSG B
1.380	87	Weighted Average
0.401		29.06% Pervious Area
0.979		70.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment P-2: P-2

Runoff = 0.28 cfs @ 12.10 hrs, Volume= 0.021 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 10 Yr Rainfall=4.50"

Area (ac)	CN	Description
0.045	98	Paved parking, HSG B
0.083	61	>75% Grass cover, Good, HSG B
0.128	74	Weighted Average
0.083		64.84% Pervious Area
0.045		35.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP 1 (P): Wetlands

Inflow Area = 1.380 ac, 70.94% Impervious, Inflow Depth > 3.10" for 10 Yr event
Inflow = 4.63 cfs @ 12.10 hrs, Volume= 0.356 af
Outflow = 4.63 cfs @ 12.10 hrs, Volume= 0.356 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (P): Right of Way

Inflow Area = 0.128 ac, 35.16% Impervious, Inflow Depth > 1.97" for 10 Yr event
Inflow = 0.28 cfs @ 12.10 hrs, Volume= 0.021 af
Outflow = 0.28 cfs @ 12.10 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment P-1: P-1

Runoff = 5.83 cfs @ 12.10 hrs, Volume= 0.454 af, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 25 Yr Rainfall=5.40"

Area (ac)	CN	Description
0.979	98	Paved parking, HSG B
0.401	61	>75% Grass cover, Good, HSG B
1.380	87	Weighted Average
0.401		29.06% Pervious Area
0.979		70.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment P-2: P-2

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.029 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 25 Yr Rainfall=5.40"

Area (ac)	CN	Description
0.045	98	Paved parking, HSG B
0.083	61	>75% Grass cover, Good, HSG B
0.128	74	Weighted Average
0.083		64.84% Pervious Area
0.045		35.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP 1 (P): Wetlands

Inflow Area = 1.380 ac, 70.94% Impervious, Inflow Depth > 3.94" for 25 Yr event
Inflow = 5.83 cfs @ 12.10 hrs, Volume= 0.454 af
Outflow = 5.83 cfs @ 12.10 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (P): Right of Way

Inflow Area = 0.128 ac, 35.16% Impervious, Inflow Depth > 2.69" for 25 Yr event
Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.029 af
Outflow = 0.38 cfs @ 12.10 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment P-1: P-1

Runoff = 7.30 cfs @ 12.10 hrs, Volume= 0.574 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 100 Yr Rainfall=6.50"

Area (ac)	CN	Description
0.979	98	Paved parking, HSG B
0.401	61	>75% Grass cover, Good, HSG B
1.380	87	Weighted Average
0.401		29.06% Pervious Area
0.979		70.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment P-2: P-2

Runoff = 0.51 cfs @ 12.10 hrs, Volume= 0.038 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type III 24-hr 100 Yr Rainfall=6.50"

Area (ac)	CN	Description
0.045	98	Paved parking, HSG B
0.083	61	>75% Grass cover, Good, HSG B
0.128	74	Weighted Average
0.083		64.84% Pervious Area
0.045		35.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP 1 (P): Wetlands

Inflow Area = 1.380 ac, 70.94% Impervious, Inflow Depth > 4.99" for 100 Yr event
Inflow = 7.30 cfs @ 12.10 hrs, Volume= 0.574 af
Outflow = 7.30 cfs @ 12.10 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach DP 2 (P): Right of Way

Inflow Area = 0.128 ac, 35.16% Impervious, Inflow Depth > 3.61" for 100 Yr event
Inflow = 0.51 cfs @ 12.10 hrs, Volume= 0.038 af
Outflow = 0.51 cfs @ 12.10 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

APPENDIX D – STORMWATER MANAGEMENT CALCULATIONS

- TSS REMOVAL
- OIL-GRIT SEPARATOR SIZING CALCULATIONS
- PROPOSED DRAINAGE CATCH BASIN TRIBUTARY MAP
- PIPE SIZING CALCULATIONS

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: 84 Macy Street Amesbury, MA

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Stormwater Quality Unit	**0.82**	**0.75**	**0.62**	**0.13**

Total TSS Removal = **87%** **Completed for Each Outlet or**

Project: **W162000**

Prepared By: **Bohler Engineering**

Date: **9/8/2016**

*Equals remaining load from previous BMP (E) which enters the BMP

Project: McDonald's Restaurant
Location: 84 Macy St, Amesbury, MA
Prepared For: Brandon Barry, Bohler Engineering

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1.0" of runoff.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given:

Structure Name	Impv. (acres)	A ($miles^2$)	t_c (min)	t_c (hr)	WQV (in)
SWQU	0.97	0.0015155	6.0	0.100	1.00

Procedure:

Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Structure Name	qu (csm/in.)
SWQU	774.00

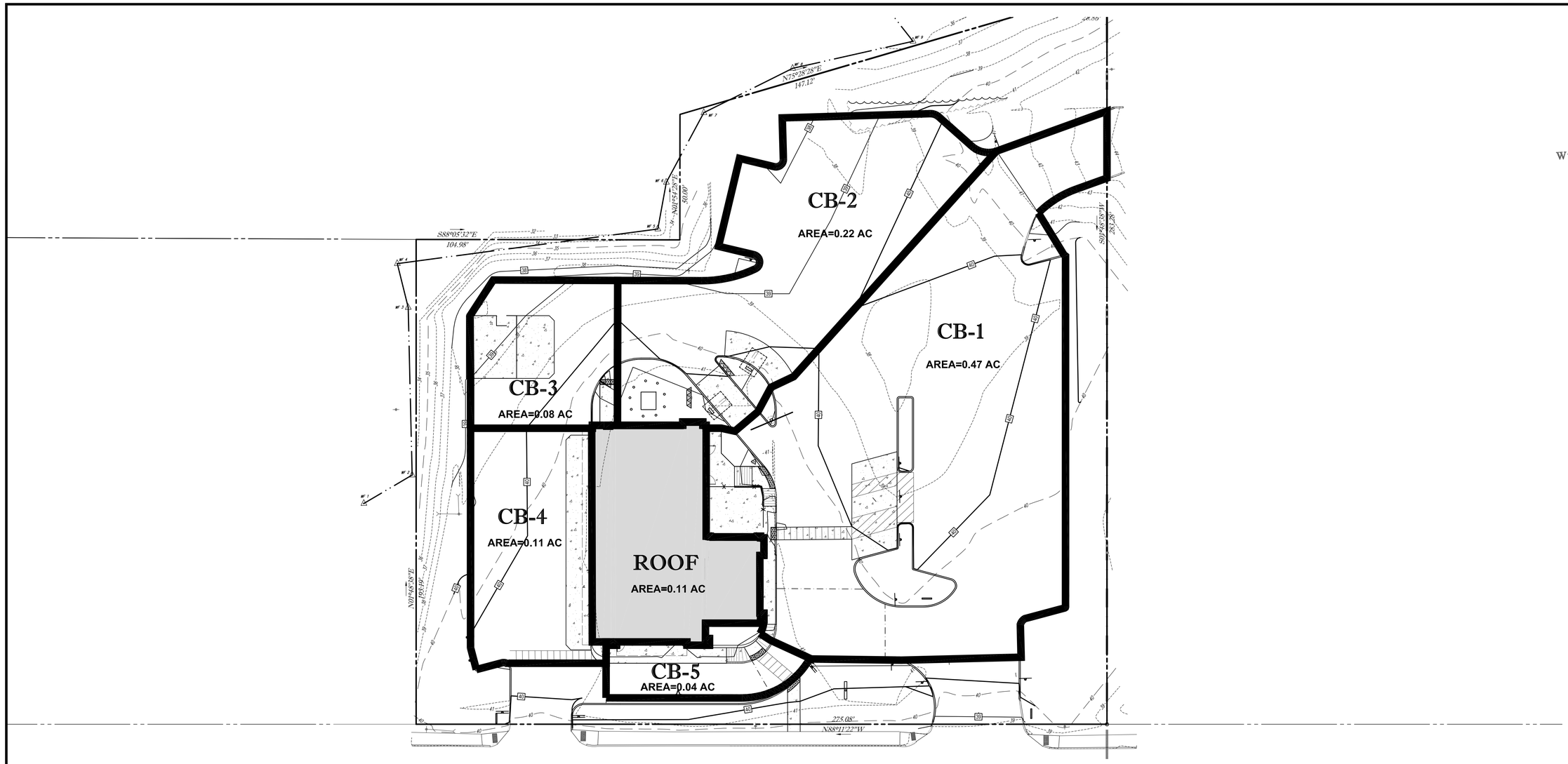
1. Compute Q Rate using the following equation:

$$Q_1 = (qu)\ (A)\ (WQV)$$

where:

Q_1 = flow fate associated with first 1.0" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1.0" in this case)

Structure Name	Q_1 (cfs)
SWQU	1.17



MACY STREET

(A.K.A. ROUTE 110)

(PUBLIC - 80' WIDE - 1928 LAYOUT NO. 2503)

ASPHALT ROADWAY

TWO WAY TRAFFIC

PROPOSED CATCH BASIN DRAINAGE TRIBUTARY MAP

NOT TO SCALE

PREPARED BY

BOHLER ENGINEERING

811 Know what's below. Call before you dig.

DRAINAGE COMPUTATIONS

COMP. BY: BPB

DATE: 9/8/2016

PROJECT: McDondald's

JOB NO. W162000

Location: 84 Macy Street , Amesbury, MA

RATIONAL METHOD PIPE CALCULATIONS

DESIGN PERIOD: 25-YEAR STORM

LOCATION			IMPERVIOUS			LANDSCAPE			AVG			Q					Q
FROM	TO	A (total)	A	C	CA	A	C	CA	C	Tc	I	CxIxA	D	S	n	L	full
		(Ac)	(Ac)			(Ac)				(Min)	in/hr	(cfs)	(in)	(ft/ft)		(ft)	(cfs)
CB-1	DMH-1	0.47	0.45	0.90	0.403	0.02	0.30	0.007	0.87	6	6.0	2.46	12	0.022	0.012	89	5.72
CB-2	DMH-1	0.22	0.20	0.90	0.176	0.02	0.30	0.007	0.83	6	6.0	1.10	12	0.005	0.012	80	2.73
DMH-1	DMH-2	0.69	0.64	0.90	0.579	0.05	0.30	0.014	0.86	6	6.0	3.56	15	0.005	0.012	86	4.95
CB-3	DMH-2	0.08	0.08	0.90	0.070	0.00	0.30	0.000	0.90	6	6.0	0.42	12	0.010	0.012	54	3.86
CB-5	DMH-3	0.04	0.04	0.90	0.033	0.00	0.30	0.001	0.84	6	6.0	0.21	12	0.025	0.012	65	6.10
ROOF	DMH-2	0.11	0.11	0.90	0.097	0.00	0.30	0.000	0.90	6	6.0	0.58	8	0.010	0.012	27	1.31
DMH-3	DMH-2	0.15	0.14	0.90	0.130	0.00	0.30	0.001	0.88	6	6.0	0.79	12	0.025	0.012	75	6.10

APPENDIX E – OPERATION AND MAINTENACE PLAN

STORMWATER OPERATION & MAINTENANCE PLAN

84 Macy Street
Amesbury, Massachusetts

RESPONSIBLE PARTY / OWNER:

McDonald's USA, LLC
690 canton Street
Westwood, MA 02090

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Upon proper notice to the property owner, the City of Amesbury or authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the OWNER – McDonald's USA, LLC or its assignee):

1. Parking lots and on-site driveways shall be swept at least twice per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of off site in accordance with MADEP and other applicable requirements.

2. All catch basins and pipe outfalls shall be inspected two times per year. These features shall be cleaned two (2) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the structure. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off site in accordance with MADEP and other applicable requirements. Periodic cleaning, repair and/or replacement of rip rap may be necessary due to erosion, etc.

3. Water Quality Unit: Unit shall be inspected and cleaned per manufacturer's recommendations.

LONG-TERM POLLUTION PREVENTION PLAN (LTPPP)

84 Macy Street
Amesbury, Massachusetts

RESPONSIBLE PARTY / OWNER:

McDonald's USA, LLC
690 canton Street
Westwood, MA 02090

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

1. The property owner shall be responsible for "good housekeeping" including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.

2. Trash and other debris shall be removed from the driveways and parking lots on a semi-annual basis.

3. Trash and other debris shall be removed from landscaped and planted areas on a semi-annual basis.

4. Proper storage and removal of solid waste (dumpsters).

5. Regular sweeping of the parking lot pavement areas, as indicated in the "O&M Plan".

6. Regular inspections and maintenance of Stormwater Management System as noted in the "O&M Plan".

7. Snow removal shall be the responsibility of the property owner. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.

8. The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.

Illicit Discharge Statement

As noted in the Stormwater Pollution Prevention Plan (SWPPP) for this project, certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

SPILL PREVENTION AND RESPONSE PROCEDURES (POST-CONSTRUCTION)

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. The minimum practical quantity of all such materials will be kept on site.

3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.

4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)

2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided or similar).

4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within fourteen (14) days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

STORMWATER MANAGEMENT SYSTEM
POST-CONSTRUCTION INSPECTION REPORT

LOCATION:
84 Macy Street
Amesbury, Massachusetts

RESPONSIBLE PARTY:
McDondald's USA, LLC
690 Canton Street,
Westwood, MA 02090

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Catch Basins :	
Discharge Points:	
Stormwater Quality Unit:	
Outfall:	
Other:	
Other:	

STORMWATER MANAGEMENT SYSTEM
POST-CONSTRUCTION INSPECTION REPORT

Note Actions taken on the Following (sediment and/or debris removal, repairs, etc.):
Catch Basins:
Discharge Points:
Stormwater Quality Unit:
Outfall:
Other:
Other:
Comments:

McDondald's USA, LLC
84 Macy Street
Amesbury, MA

Spill Prevention Control and Countermeasure Plan (Post Construction)

HAZARDOUS SUBSTANCE REPORTABLE QUANTITY RELEASE FORM

The discharges of hazardous substances in stormwater discharges from developed sites must be prevented or minimized in accordance with various local, state and federal requirements. Where a release containing a hazardous substance in an amount equal to or in excess of a Reportable Quantity (RQ) established under 40CFR and/or EPA's list of RQ's (whichever is more restrictive) occurs, the following steps must be taken:

1. All measures must be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to off-site locations, receiving waters, wetlands and/or resource areas.

2. In the event of a spill immediately notify:
- The Amesbury Fire Department (at **9-1-1**) AND
- Emergency Response section at MassDEP at the toll-free 24-hour statewide number: **1-888-304-1133**

3. Contact the Project Manager, Owner or Environmental Consultant/LSP of Record immediately upon knowledge of release.

Date of Spill	**Material Spilled**	**Approximate Quantity of Spill (in gallons)**	**Agency(s) Notified**	**Date of Notification**

Note: The OWNER is responsible for maintaining a list of current RQ's for all hazardous substances encountered, stored on-site or anticipated to be encountered.

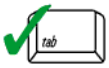
APPENDIX F – STORMWATER MANAGEMENT CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☒ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☒ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.