PROJECT MANUAL & DRAINAGE REPORT

"Quality Fleet Services, Inc."

SITE RE-DEVELOPMENT

548 New Ludlow Road
South Hadley, MA

June 2015

COMMONWEALTH OF MASSACHUSETTS
DONALD J. FRYDRYK
CIVIL
No. 35839
REGISTERED PROFESSIONAL ENGINEER

Prepared for:

Owner:
The Moynihan Realty Group, LLC
625 State Street
Belchertown, MA 01007

Applicant:
Quality Fleet Services, Inc.
625 State Street
Belchertown, MA 01007

Prepared by:

Sherman & Frydryk, LLC
Land Surveying and Engineering
3 Converse Street, Suite 203
Palmer, MA 01069

"Quality Fleet Services, Inc."

SITE RE-DEVELOPMENT

548 New Ludlow Road
South Hadley, MA

Drainage Report

Introduction

This report has been prepared to summarize the work associated with the proposed site improvements at 548 New Ludlow Road, South Hadley (See locus plan in appendix A of this report) and to analyze storm water management for the proposed improvements. The project takes place on Parcel 8 as shown on the Town of South Hadley Assessor's Map 8. This narrative has been prepared in conjunction with plans entitled "Quality Fleet Services, Inc., Site Re-Development, 548 New Ludlow Road, South Hadley, MA", prepared by Sherman & Frydryk, LLC, Land Surveying and Engineering, dated June 10, 2015; four sheets.

The site improvements include the construction of a 14,580 square foot maintenance building, a small paved parking area for office staff, and a second driveway entrance. The driveway entrances will be constructed with a paved apron to the limit of the right of way. The site will remain gravel outside of the proposed building with 4-foot concrete aprons at the overhead door locations. This project will also include the construction of an open channel drainage system with a sediment basin, sediment forebay, and infiltration basin for stormwater mitigation. During the more severe storms, any overflow from the infiltration system will discharge overland toward the wetlands east of the property.

The project area is not within a Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife, as shown on the Oct. 2008, Massachusetts Natural Heritage Atlas, 13th Edition (see Appendix A of the drainage report). The project area is not within the mapped area of the 100-year flood plain as shown on FEMA Community Panel # 2501700010A (See Appendix 2 of the Notice of Intent).

Drainage Report

Site Soils: The existing site consists of an open gravel surface used for bulk material storage and transfer with steep slopes up to the perimeter of the parcel along the west sideline, north rear line, and a portion of the east sideline. A wetland area exists to the east of the parcel and within the property line in the northeast portion of the property.

According to the Soil Conservation Service Hampden County (central part) soil maps, the soil types on the site consist of Hu – Hinkley-Merrimac-Urban Land, Pg – Pits (Gravel), Sw – Swansea Muck, & WnD – Windsor Loamy Sand (See Appendix B of this report). The Hinkley-Merrimac-Urban Land, Pits (Gravel), & Windsor Loamy Sand soils fall into hydrologic group "A". The Swansea Muck soils fall into hydrologic group "D".

This soil data was supplemented by six test pits on the parcel with three in the area of the proposed infiltration basin and three along the roadway frontage. The estimated seasonal high groundwater elevation is estimated at elevation 245.0 in the area of the infiltration basin. A soil texture of sand has been used to determine the design infiltration rate, based on "Table 2.3.3 1982 Rawls Rates" from the Massachusetts Stormwater Handbook, of 2.41 inches per hour. The drainage calculations have been prepared using an infiltration rate of 25 minutes per inch to provide a conservative analysis. Soil evaluation results are contained in Appendix B of this report.

Existing conditions: The site is divided into two drainage areas. The front of the parcel (Subcatchment 101) discharges storm water run-off directly to the shoulder of New Ludlow Road. New Ludlow Road does not have a closed drainage system in the vicinity of the locus property. The remaining portion of the property (Subcatchment 102) discharges overland to the existing wetlands east of the parcel.

These drainage areas were evaluated for peak flows using the "HydroCAD" Stormwater Modeling System using a 2-year 24 hour rainfall of 3.1 inches, a 10-year 24 hour rainfall of 4.5 inches, and a 100-year 24 hour rainfall of 6.5 inches as taken from the "Rainfall Frequency Atlas for the Northeast" compiled by the Soil Conservation Service. A summary of drainage calculations for existing watershed is contained in Appendix C of this report. A theoretical Pond (Pond 301) was used to calculate the peak overflow from the front of the property (Subcatchment 101) to New Ludlow Road. A theoretical Pond (Pond 302) was used to calculate the peak overflow from the rear of the property (Subcatchment 102) to the wetlands. The following is a summary of peak flows from each storm.

Existing Runoff

Year Storm	Pond 301 Peak Runoff (cfs)	Pond 302 Peak Runoff (cfs)
2	4.51	7.55
10	6.70	14.44
100	9.79	24.93

Proposed conditions: Proposed improvements to the parcel will not significantly alter the drainage patterns on the site. The front of the parcel (Subcatchment 201) discharging storm water run-off directly to the shoulder of New Ludlow Road will be reduced by the

proposed channels on the west and east property sidelines. The rear portion of the property (Subcatchment 202) will collect to a proposed sediment basin and infiltration basin (Pond 402) through open channels along the property sidelines. The infiltration basin (Pond 402) has been sized to mitigate the 100-year storm. During the more infrequent storm events, the infiltration basin (Pond 402) will discharge the detained stormwater to the vegetated buffer zone of the existing wetlands east of the parcel. The infiltration basin discharges across a wide spillway sized to maintain a low discharge flow velocity to prevent scour at the outlet.

The watershed area is evaluated for peak flows using the "HydroCAD" Stormwater Modeling System. The analysis use a Water Quality Volume 24 hour rainfall of 1.17 inches, 2-year 24 hour rainfall of 3.1 inches, a 10-year 24 hour rainfall of 4.5 inches and a 100-year 24 hour rainfall of 6.5 inches as taken from the "Rainfall Frequency Atlas for the Northeast" compiled by the Soil Conservation Service. A summary of drainage calculations for proposed conditions is contained in Appendix D of this report. A theoretical Pond (Pond 501) was used to calculate the peak overflow from the front of the property (Subcatchment 201) to New Ludlow Road. A theoretical Pond (Pond 502) was used to calculate the peak overflow from the infiltration basin (Pond 402) to the wetlands. The following is a summary of peak flows from each storm.

Proposed Runoff

Year Storm	Pond 501 Peak Runoff (cfs)	Pond 502 Peak Runoff (cfs)
2	2.37	5.87
10	4.06	12.59
100	6.49	23.25

SUMMARY

Through the use of additional vegetated areas on the perimeter of the site, the open drainage channels, and infiltration basin system, the proposed improvements will decrease peak flow rates for the design storms analyzed. As such, we believe this project will have no negative affect on the existing watersheds.

An Operation and Maintenance Plan is included as Appendix E, the Stormwater Management Standards and Check List has been included as Appendix F, and the Stormwater Pollution Prevention Plan is included as Appendix G of this report. The EPA NOI shall be filed prior to construction.

APPENDIX A

LOCUS PLAN

SCALE 1:25 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

SPRINGFIELD NORTH, MASS.

N4207.5—W7230/7.5

1972

PHOTOREVISED 1979

AMS 6468 II NE—SERIES V814

SHERMAN & FRYDRYK, LLC

Land Surveying and Engineering

3 Converse St.
Suite 203
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SITE LOCUS ON U.S.G.S. SPRINGFIELD NORTH QUAD

PREPARED FOR

QUALITY FLEET SERVICES, INC.
548 NEW LUDLOW ROAD
SOUTH HADLEY, MA

DATE: 6/9/15	PROJECT NO: 14121B	DRAFTING: GAB
CHECKED: KTT	APPROVED: N/A	HORZ: 1:25,000

MASSACHUSETTS NATURAL HERITAGE ATLAS

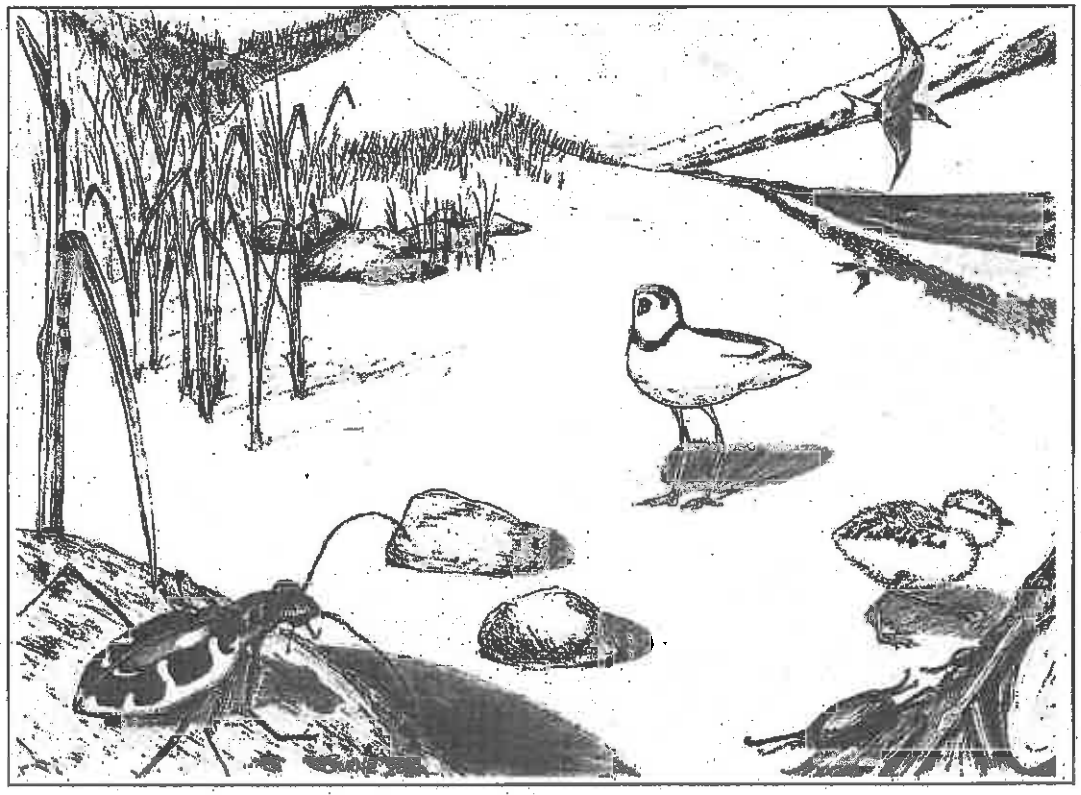
13TH EDITION

This Atlas contains maps displaying:

PRIORITY HABITATS OF RARE SPECIES

ESTIMATED HABITATS OF RARE WILDLIFE

CERTIFIED VERNAL POOLS



EFFECTIVE OCTOBER 1, 2008

- Maps in this Atlas show rare species habitat information against color aerial photographs, organized geographically by 1:50,000 scale quadrangle maps
- **Priority Habitats**: for use with the Massachusetts Endangered Species Act Regulations (321 CMR 10.00).
- **Estimated Habitats**: for use with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
Tel: (508) 389-6360 Fax: (508) 389-7891
www.nhesp.org

Priority Habitats and Estimated Habitats - Effective October 1, 2008

Priority Habitats for use with the MA Endangered Species Act Regulations (321 CMR 1
Estimated Habitats for use with the MA Wetlands Protection Act Regulations (310 CMR

Produced by the Natural Heritage & Endangered Species Program *website: www.nhesp.org*

Springfield North Quad

Priority Habitat of Rare Species

Priority Habitat of Rare Species and also Estimated Habitat of Rare Wildlife

Certified Vernal Pool (as of July 31, 2008)

N

0 0.5 1 2 Miles

SHERMAN & FRYDRYK, LLC
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Suite 203
Palmer, MA 01069

SITE LOCUS ON NATURAL HERITAGE ATLAS

PREPARED FOR

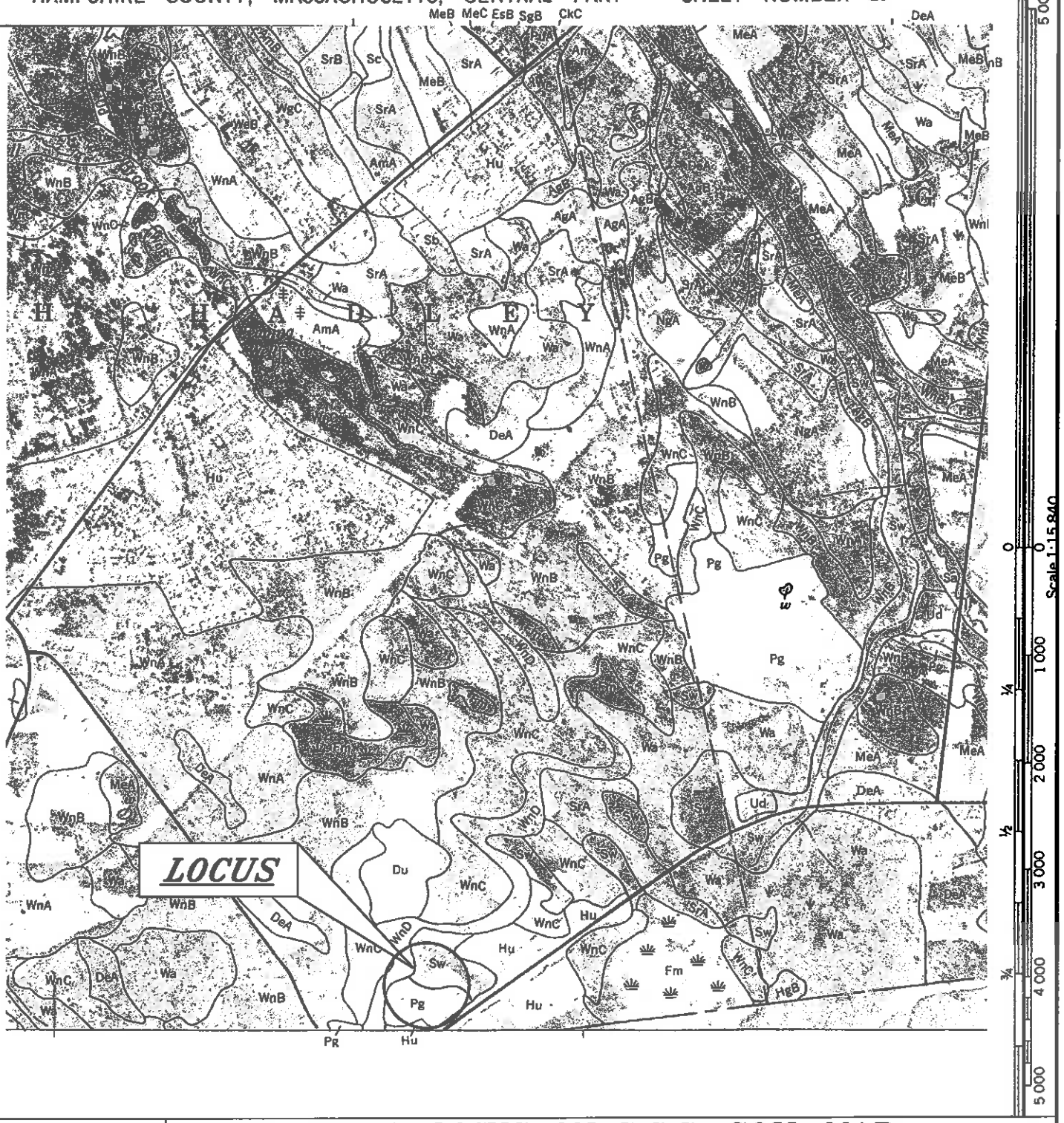
QUALITY FLEET SERVICES, INC.
548 NEW LUDLOW ROAD
SOUTH HADLEY, MA

DATE: 6/9/15	PROJECT NO: 14121B	DRAFTING: GAB
CHECKED: KTT	APPROVED: N/A	HORZ: N/A

APPENDIX B

SOILS INFORMATION

HAMPSHIRE COUNTY, MASSACHUSETTS, CENTRAL PART — SHEET NUMBER 29



SHERMAN & FRYDRYK, LLC
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SITE LOCUS ON S.C.S. SOIL MAP

PREPARED FOR

QUALITY FLEET SERVICES, INC.
548 NEW LUDLOW ROAD
SOUTH HADLEY, MA

DATE: 6/9/15	PROJECT NO: 14121B	DRAFTING: GAB
CHECKED: KTT	APPROVED: N/A	HORZ: 1:15,840

Location Address or Lot No. QFS New Ludlow Rd
South Hadley

On-site Review

Deep Hole Number ..... Date: ..... Time: ..... Weather .....
Location (identify on site plan) .....
Land Use ..... Slope (%) ..... Surface Stones .....
Vegetation .....
Landform .....
Position on landscape (sketch on the back) .....
Distances from:

Open Water Body ..... feet Drainage way ..... feet
Possible Wet Area ..... feet Property Line ..... feet
Drinking Water Well ..... feet Other .....

DEEP OBSERVATION HOLE LOG*

	Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
TP 101	0-4" 4-65"	Fill C1	LS	2.5Y 7/3	30"	0% Gravel Weeping @ 40"
TP 102	0-6" 6-46"	Fill C1	LS	"	24"	0% Gravel weeping @ 32"
TP 103	0-36" 36-40" 40"-64"	Fill A C1	organics & stone LS	2.5Y 5/4	40"	Large Cobbles Weeping @ 48"
TP 201	0-28 28-54	Fill C1	LS	2.5Y 7/2	None Obs	0% Gravel No weeping
TP 202	0-58 58-60 60-94	Fill A B/C	Sand LS	5Y 6/8	None Obs	0% Gravel

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: .....
Depth to Groundwater: Standing Water in the Hole: ..... Weeping from Pit Face: .....
Estimated Seasonal High Ground Water: .....

TP203 0-16" Fill
16-20" A/B 10YR 5/5
20-96" C 5Y 6/8
weeping @ 94"

Soil survey of
Hampshire County, Massachusetts
Central part

U.S. Department of Agriculture, Soil Conservation Service
in cooperation with Massachusetts Agricultural Experiment Station

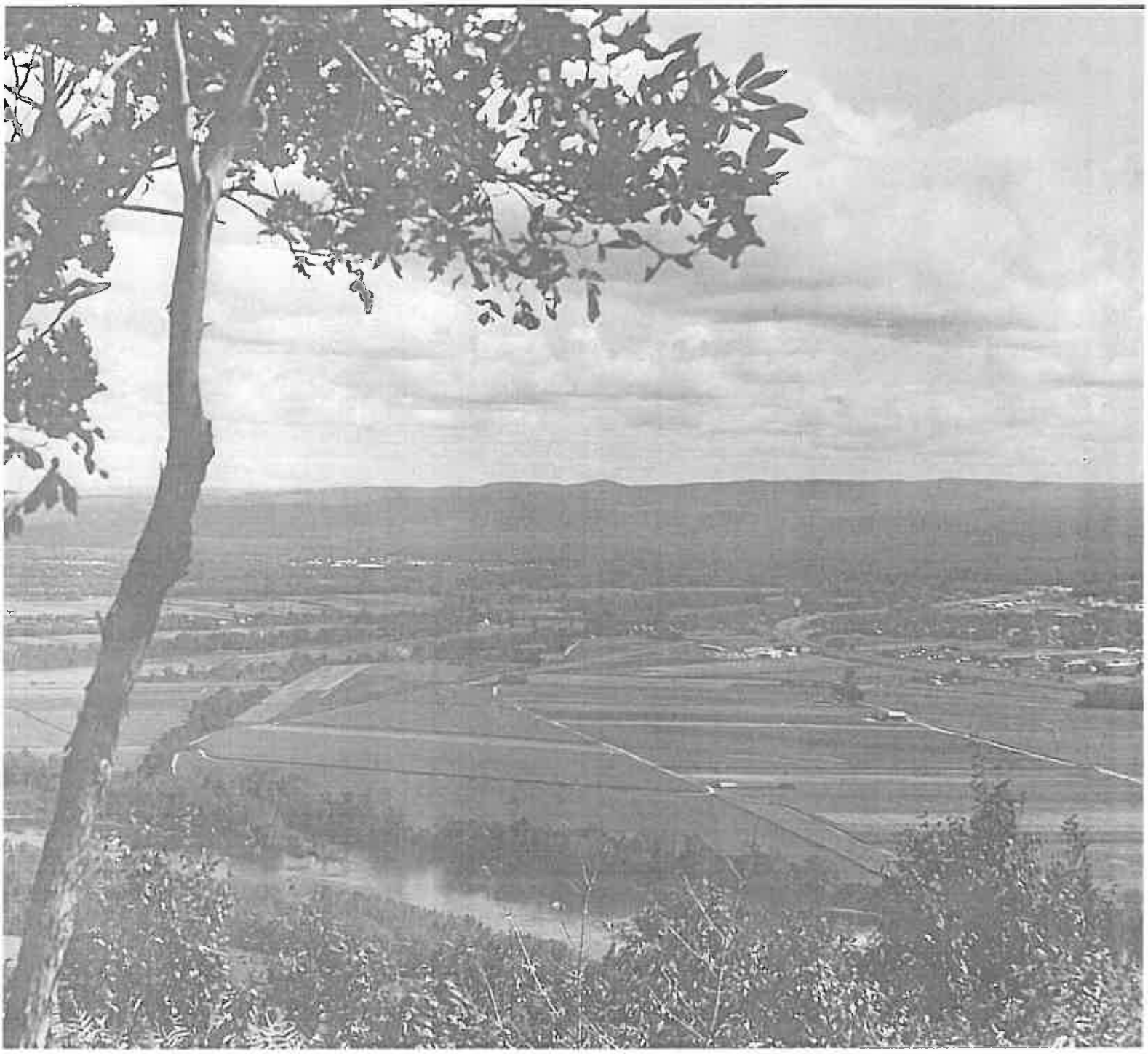


TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AgA, AgB, AgC----- Agawam	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
AmA, AmB---------- Amostown	C	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Moderate.
Au*:												
Amostown---------	C	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Moderate.
Windsor----------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Urban land.												
BaA, BaB---------- Belgrade	B	None--------	---	---	1.5-3.5	Apparent	Nov-Apr	>60	---	High-----	Moderate	Moderate.
BoA, BoB, BoC----- Boxford	C	None--------	---	---	1.5-3.0	Apparent	Nov-Apr	>60	---	High-----	High-----	Moderate.
CkB, CkC, CmB, CmC, CnB, CnC, CnD---------- Charlton	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
CoE*:												
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Gloucester-------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
CpC*, CpD*:												
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Hollis----------	C/D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
CrC*, CrE*:												
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Rock outcrop.												
Hollis----------	C/D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
DeA---------- Deerfield	B	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low------	High.
Du*. Dumps												
EsA, EsB---------- Enosburg	D	None--------	---	---	0-1.0	Apparent	Nov-May	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Fm---------- Freetown	D	None---------	---	---	0-1.0	Apparent	Jan-Dec	>60	---	High------	High------	High.
GfB, GfC, GhB, GhC, GxB, GxC, GxD---------- Gloucester	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Ha---------- Hadley	B	Occasional	Brief------	Feb-Apr	4.0-6.0	Apparent	Nov-Apr	>60	---	High------	Low-------	Moderate.
Hd*:												
Hadley----------	B	Occasional	Brief------	Feb-Apr	4.0-6.0	Apparent	Nov-Apr	>60	---	High------	Low-------	Moderate.
Winooski---------	B	Occasional	Brief------	Feb-Apr	1.5-3.0	Apparent	Nov-Apr	>60	---	High------	Moderate	Moderate.
Urban land.												
HfB, HfC---------- Haven	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low-------	High.
HgA, HgB, HgC, HgD, HgE--------- Hinckley	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Hu*:												
Hinckley---------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Merrimac---------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Urban land.												
HvC---------- Holyoke	C/D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low-------	High.
Lk---------- Limerick	C	Frequent-----	Brief------	Jan-Jun	0.5-1.5	Apparent	Nov-Jun	>60	---	High------	High------	Low.
Ma**---------- Maybid	D	None---------	---	---	+1-0.5	Apparent	Oct-Aug	>60	---	High------	High------	Moderate.
MeA, MeB, MeC, MeD---------- Merrimac	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
MoB, MoC, MsC, MxB, MxC, MxD---- Montauk	C	None---------	---	---	2.0-2.5	Perched	Feb-May	>60	---	Moderate	Low-------	High.
NaC*, NaD*:												
Narragansett------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low-------	Moderate.
Holyoke----------	C/D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low-------	High.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
NaC*, NaD*: Rock outcrop.												
NgA, NgB: Ninigret	B	None	---	---	1.5-3.0	Apparent	Nov-Apr	>60	---	Moderate	Low	High.
PaB, PaC, PaD, PbB, PbC, PbD, PcB, PcC, PcD, PcE: Paxton	C	None	---	---	1.5-2.5	Perched	Feb-Mar	>60	---	Moderate	Low	Moderate.
Pd*:												
Paxton	C	None	---	---	1.5-2.5	Perched	Feb-Mar	>60	---	Moderate	Low	Moderate.
Charlton	B	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
Urban land.												
Pg*. Pits												
PuA, PuB, PuC: Pollux	C	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Pv: Pootatuck	B	Frequent	Brief	Nov-Apr	1.5-3.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate	Moderate.
Qu*. Quarries												
Ra: Raynham	C	None	---	---	0.5-2.0	Apparent	Nov-May	>60	---	High	High	Moderate.
RdA, RdB, ReA, ReB: Ridgebury	C	None	---	---	0-1.5	Perched	Nov-May	>60	---	High	High	High.
Rm: Rippowam	C	Frequent	Brief	Nov-Apr	0-1.5	Apparent	Nov-May	>60	---	High	High	High.
Ro*. Rock outcrop												
RoC*, RoE*: Rock outcrop.												
Narragansett	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Holyoke	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	High.
Sa: Saco	D	Frequent	Brief	Nov-May	0-0.5	Apparent	Sep-Jun	>60	---	High	Low	Moderate.

See footnote at end of table.

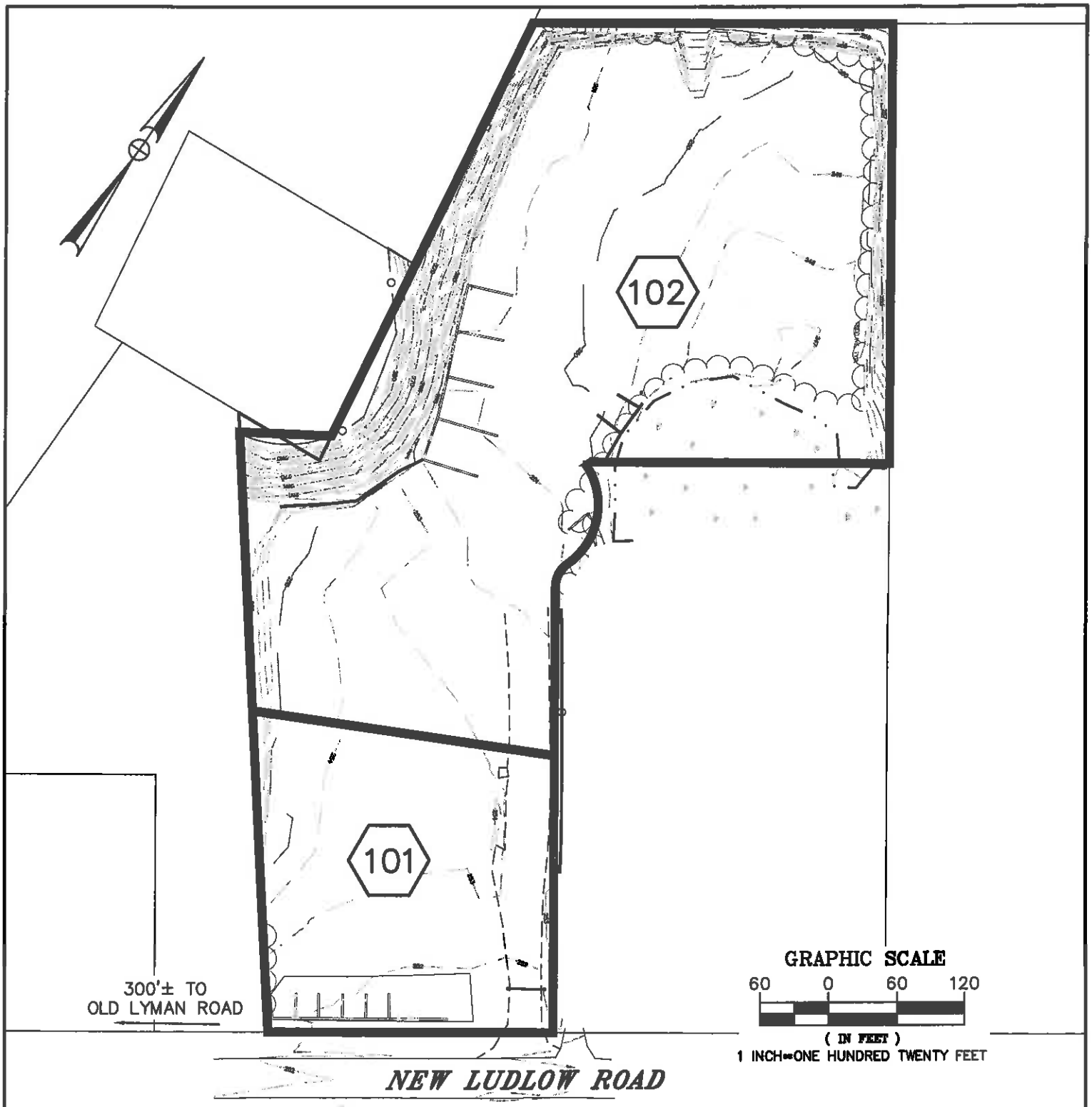
TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Sb**: Scarboro	D	None	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	High	High	High.
Sc: Scitico	C	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High	High	Moderate.
SgB, ShB, ShC: Scituate	C	None	---	---	1.5-3.0	Perched	Nov-May	>60	---	Moderate	Low	High.
SrA, SrB: Sudbury	B	None	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low	High.
Su: Suncook	A	Common	Brief	Mar-May	4.0-6.0	Apparent	Jan-Apr	>60	---	Low	Low	High.
Sw: Swansea	D	None	---	---	0-1.0	Apparent	Jan-Dec	>60	---	High	High	High.
Ud*. Udorthents												
Wa: Walpole	C	None	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High	Low	High.
WeB, WeC, WfB, WfC, WgB, WgC: Wethersfield	C	None	---	---	1.5-2.5	Perched	Feb-Mar	>60	---	Moderate	Low	Moderate.
WhA**: Whitman	D	None	---	---	+1-0.5	Perched	Sep-Jun	>60	---	High	High	High.
WnA, WnB, WnC, WnD: Windsor	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
WoA, WoB, WoC: Windsor	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
Wp*:												
Windsor	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
Scitico	C	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High	High	Moderate.
Amostown	C	None	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Moderate.
Ws: Winooski	B	Occasional	Brief	Feb-Apr	1.5-3.0	Apparent	Nov-Apr	>60	---	High	Moderate	Moderate.
WtA, WtB, WtC, WvB, WvC, WxB, WxC, WxD: Woodbridge	C	None	---	---	1.5-3.0	Perched	Nov-May	>60	---	High	Low	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.
** In the "High water table--Depth" column, a plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

APPENDIX C

PRE-DEVELOPMENT CONDITIONS



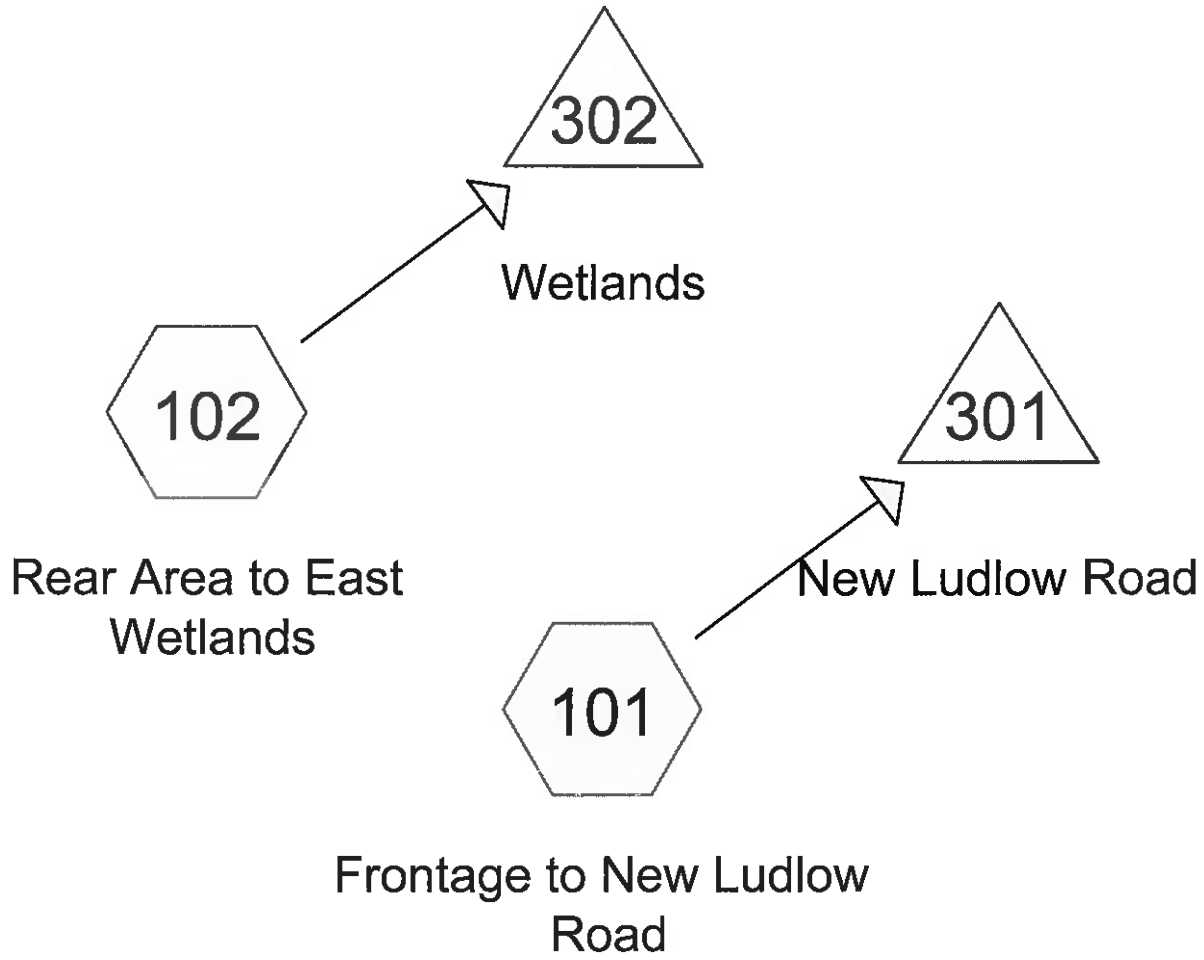
SHERMAN & FRYDRYK, LLC
Land Surveying and Engineering
3 Converse St.
Suite 203
Palmer, MA 01069

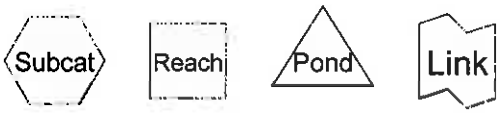
EXISTING WATERSHED CONDITIONS

PREPARED FOR

QUALITY FLEET SERVICES, INC.
548 NEW LUDLOW ROAD
SOUTH HADLEY, MA.

DATE: 6/8/15	PROJECT NO: 14121B	DRAFTING: KTT
CHECKED: JDG	APPROVED:	HORZ: 1"=120'





Routing Diagram for 14121B QFS-Existing Watershed
Prepared by Sherman & Frydryk, LLC, Land Surveying and Engineering, Printed 6/8/2015
HydroCAD® 10.00-13 s/n 01267 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
58,590	30	Brush, Good, HSG A (102)
227,130	96	Gravel surface, HSG A (101, 102)
6,883	98	Paved parking, HSG A (101)
292,603	**83**	**TOTAL AREA**

Summary for Subcatchment 101: Frontage to New Ludlow Road

Runoff = 4.51 cfs @ 12.07 hrs, Volume= 14,946 cf, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.10"

Area (sf)	CN	Description
0	30	Brush, Good, HSG A
60,216	96	Gravel surface, HSG A
6,883	98	Paved parking, HSG A
67,099	96	Weighted Average
60,216	96	89.74% Pervious Area
6,883	98	10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	186	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: Rear Area to East Wetlands

Runoff = 7.55 cfs @ 12.08 hrs, Volume= 23,717 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.10"

Area (sf)	CN	Description
58,590	30	Brush, Good, HSG A
166,914	96	Gravel surface, HSG A
0	98	Paved parking, HSG A
225,504	79	Weighted Average
225,504	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 301: New Ludlow Road

Inflow Area = 67,099 sf, 10.26% Impervious, Inflow Depth = 2.67" for 2 Year event
Inflow = 4.51 cfs @ 12.07 hrs, Volume= 14,946 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.07' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 14,946 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 302: Wetlands

Inflow Area = 225,504 sf, 0.00% Impervious, Inflow Depth = 1.26" for 2 Year event
Inflow = 7.55 cfs @ 12.08 hrs, Volume= 23,717 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.11' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 23,717 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Subcatchment 101: Frontage to New Ludlow Road

Runoff = 6.70 cfs @ 12.07 hrs, Volume= 22,698 cf, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.50"

Area (sf)	CN	Description
0	30	Brush, Good, HSG A
60,216	96	Gravel surface, HSG A
6,883	98	Paved parking, HSG A
67,099	96	Weighted Average
60,216	96	89.74% Pervious Area
6,883	98	10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	186	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: Rear Area to East Wetlands

Runoff = 14.44 cfs @ 12.08 hrs, Volume= 44,659 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.50"

Area (sf)	CN	Description
58,590	30	Brush, Good, HSG A
166,914	96	Gravel surface, HSG A
0	98	Paved parking, HSG A
225,504	79	Weighted Average
225,504	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 301: New Ludlow Road

Inflow Area = 67,099 sf, 10.26% Impervious, Inflow Depth = 4.06" for 10 Year event
Inflow = 6.70 cfs @ 12.07 hrs, Volume= 22,698 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.10' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 22,698 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 302: Wetlands

Inflow Area = 225,504 sf, 0.00% Impervious, Inflow Depth = 2.38" for 10 Year event
Inflow = 14.44 cfs @ 12.08 hrs, Volume= 44,659 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.21' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 44,659 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Subcatchment 101: Frontage to New Ludlow Road

Runoff = 9.79 cfs @ 12.07 hrs, Volume= 33,827 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.50"

Area (sf)	CN	Description
0	30	Brush, Good, HSG A
60,216	96	Gravel surface, HSG A
6,883	98	Paved parking, HSG A
67,099	96	Weighted Average
60,216	96	89.74% Pervious Area
6,883	98	10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	186	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: Rear Area to East Wetlands

Runoff = 24.93 cfs @ 12.08 hrs, Volume= 77,597 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.50"

Area (sf)	CN	Description
58,590	30	Brush, Good, HSG A
166,914	96	Gravel surface, HSG A
0	98	Paved parking, HSG A
225,504	79	Weighted Average
225,504	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 301: New Ludlow Road

Inflow Area = 67,099 sf, 10.26% Impervious, Inflow Depth = 6.05" for 100 Year event
Inflow = 9.79 cfs @ 12.07 hrs, Volume= 33,827 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.16' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 33,827 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 302: Wetlands

Inflow Area = 225,504 sf, 0.00% Impervious, Inflow Depth = 4.13" for 100 Year event
Inflow = 24.93 cfs @ 12.08 hrs, Volume= 77,597 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.36' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 77,597 cf

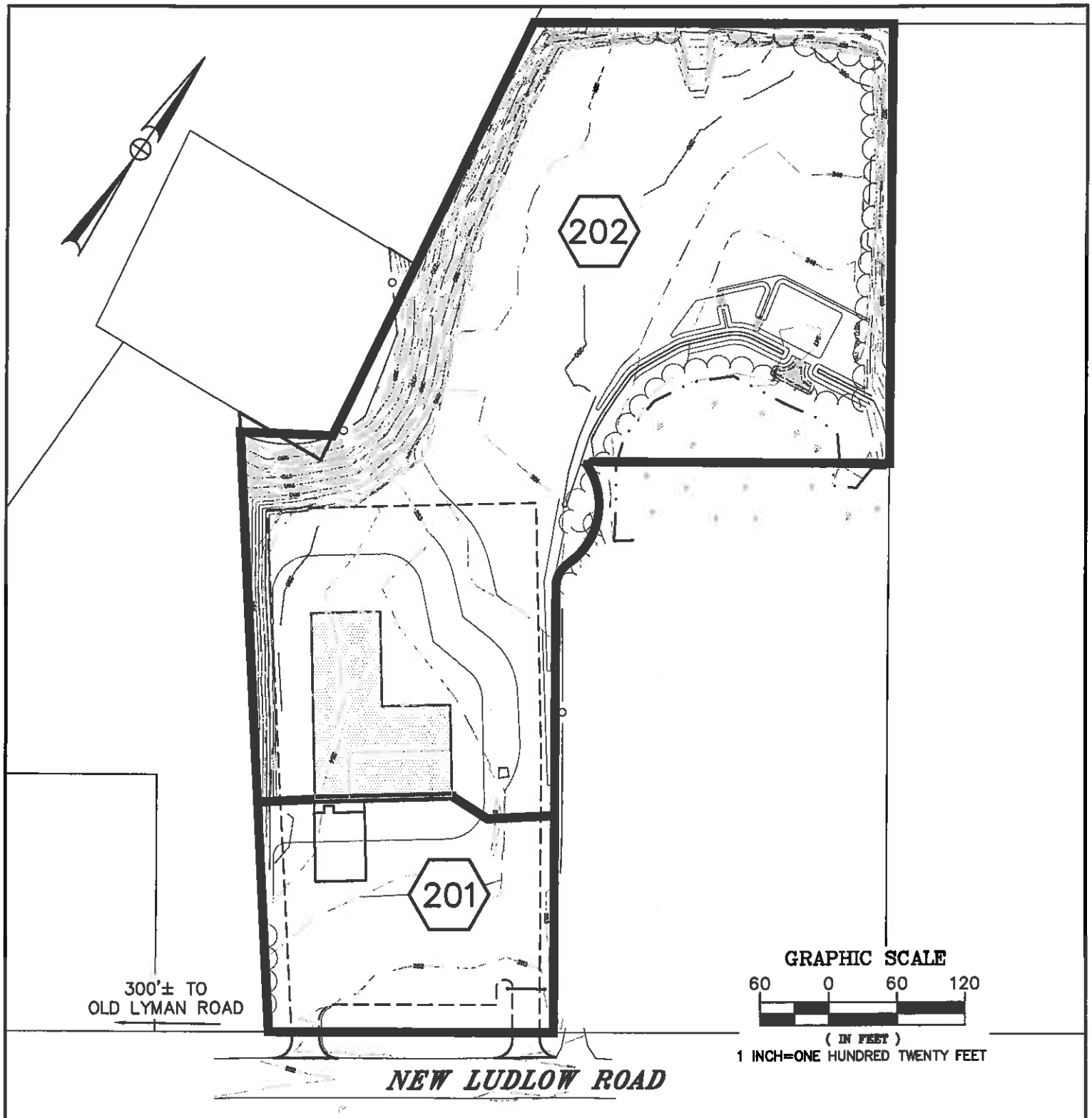
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

APPENDIX D

POST-DEVELOPMENT CONDITIONS



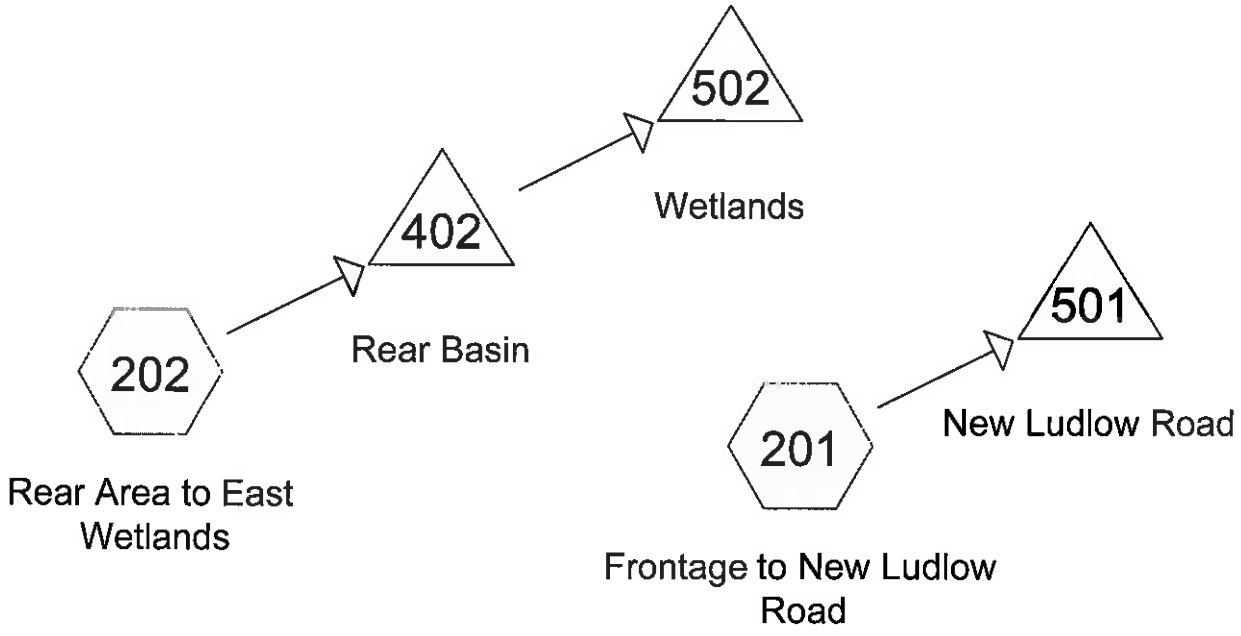
SHERMAN & FRYDRYK, LLC
Land Surveying and Engineering
3 Converse St.
Suite 203
Palmer, MA 01069

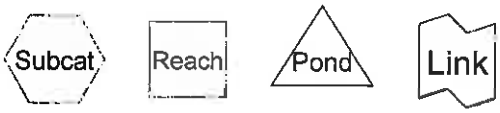
PROPOSED CONDITIONS

PREPARED FOR

QUALITY FLEET SERVICES, INC.
548 NEW LUDLOW ROAD
SOUTH HADLEY, MA.

DATE: 6/8/15	PROJECT NO: 14121B	DRAFTING: KTT
CHECKED: JDG	APPROVED:	HORZ: 1"=120'





Routing Diagram for 14121B QFS-Proposed Conditions
Prepared by Sherman & Frydryk, LLC, Land Surveying and Engineering, Printed 6/8/2015
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,811	39	>75% Grass cover, Good, HSG A (201)
78,445	30	Brush, Good, HSG A (201, 202)
191,167	96	Gravel surface, HSG A (201, 202)
3,600	98	Paved parking, HSG A (201, 202)
14,580	98	Roofs, HSG A (202)
292,603	**77**	**TOTAL AREA**

Summary for Subcatchment 201: Frontage to New Ludlow Road

Runoff = 2.37 cfs @ 12.08 hrs, Volume= 7,403 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.10"

Area (sf)	CN	Description
4,811	39	>75% Grass cover, Good, HSG A
4,034	30	Brush, Good, HSG A
39,041	96	Gravel surface, HSG A
3,050	98	Paved parking, HSG A
0	98	Roofs, HSG A
50,936	86	Weighted Average
47,886	85	94.01% Pervious Area
3,050	98	5.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	**186**	**Total, Increased to minimum Tc = 5.0 min**			

Summary for Subcatchment 202: Rear Area to East Wetlands

Runoff = 6.65 cfs @ 12.09 hrs, Volume= 21,971 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.10"

Area (sf)	CN	Description
74,411	30	Brush, Good, HSG A
152,126	96	Gravel surface, HSG A
550	98	Paved parking, HSG A
14,580	98	Roofs, HSG A
241,667	76	Weighted Average
226,537	74	93.74% Pervious Area
15,130	**98**	**6.26% Impervious Area**

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 402: Rear Basin

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 1.09" for 2 Year event
Inflow = 6.65 cfs @ 12.09 hrs, Volume= 21,971 cf
Outflow = 6.18 cfs @ 12.12 hrs, Volume= 21,971 cf, Atten= 7%, Lag= 2.2 min
Discarded = 0.31 cfs @ 12.12 hrs, Volume= 11,897 cf
Primary = 5.87 cfs @ 12.12 hrs, Volume= 10,074 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 248.52' @ 12.12 hrs Surf.Area= 6,323 sf Storage= 2,755 cf

Plug-Flow detention time= 41.0 min calculated for 21,956 cf (100% of inflow)
Center-of-Mass det. time= 41.0 min (886.6 - 845.6)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	1,185 cf	**Sediment Basin (Prismatic)**Listed below (Recalc)
#2	248.00'	1,115 cf	**Sediment Forebay (Prismatic)**Listed below (Recalc)
#3	248.00'	3,962 cf	**Infiltration Basin (Prismatic)**Listed below (Recalc)
		6,262 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	820	0	0
249.00	1,550	1,185	1,185

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	880	0	0
249.00	1,350	1,115	1,115

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	2,650	0	0
249.00	5,273	3,962	3,962

Device	Routing	Invert	Outlet Devices
#1	Primary	248.35'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 248.35 249.35 Width (feet) 26.00 34.00
#2	Discarded	248.00'	**2.140 in/hr Exfiltration (25 mpi) over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.31 cfs @ 12.12 hrs HW=248.51' (Free Discharge)
└**2=Exfiltration (25 mpi)** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=5.59 cfs @ 12.12 hrs HW=248.51' (Free Discharge)
└**1=Custom Weir/Orifice** (Weir Controls 5.59 cfs @ 1.31 fps)

Summary for Pond 501: New Ludlow Road

Inflow Area = 50,936 sf, 5.99% Impervious, Inflow Depth = 1.74" for 2 Year event
Inflow = 2.37 cfs @ 12.08 hrs, Volume= 7,403 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.03' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 7,403 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 502: Wetlands

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 0.50" for 2 Year event
Inflow = 5.87 cfs @ 12.12 hrs, Volume= 10,074 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.05' @ 16.40 hrs Surf.Area= 217,800 sf Storage= 10,074 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Subcatchment 201: Frontage to New Ludlow Road

Runoff = 4.06 cfs @ 12.07 hrs, Volume= 12,693 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.50"

Area (sf)	CN	Description
4,811	39	>75% Grass cover, Good, HSG A
4,034	30	Brush, Good, HSG A
39,041	96	Gravel surface, HSG A
3,050	98	Paved parking, HSG A
0	98	Roofs, HSG A
50,936	86	Weighted Average
47,886	85	94.01% Pervious Area
3,050	98	5.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	186	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 202: Rear Area to East Wetlands

Runoff = 13.45 cfs @ 12.08 hrs, Volume= 42,610 cf, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.50"

Area (sf)	CN	Description
74,411	30	Brush, Good, HSG A
152,126	96	Gravel surface, HSG A
550	98	Paved parking, HSG A
14,580	98	Roofs, HSG A
241,667	76	Weighted Average
226,537	74	93.74% Pervious Area
15,130	98	6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 402: Rear Basin

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 2.12" for 10 Year event
Inflow = 13.45 cfs @ 12.08 hrs, Volume= 42,610 cf
Outflow = 12.93 cfs @ 12.11 hrs, Volume= 42,610 cf, Atten= 4%, Lag= 1.7 min
Discarded = 0.33 cfs @ 12.11 hrs, Volume= 15,523 cf
Primary = 12.59 cfs @ 12.11 hrs, Volume= 27,087 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 248.62' @ 12.11 hrs Surf.Area= 6,734 sf Storage= 3,456 cf

Plug-Flow detention time= 32.9 min calculated for 42,581 cf (100% of inflow)
Center-of-Mass det. time= 33.0 min (863.1 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	1,185 cf	**Sediment Basin (Prismatic)**Listed below (Recalc)
#2	248.00'	1,115 cf	**Sediment Forebay (Prismatic)**Listed below (Recalc)
#3	248.00'	3,962 cf	**Infiltration Basin (Prismatic)**Listed below (Recalc)
		6,262 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	820	0	0
249.00	1,550	1,185	1,185

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	880	0	0
249.00	1,350	1,115	1,115

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	2,650	0	0
249.00	5,273	3,962	3,962

Device	Routing	Invert	Outlet Devices
#1	Primary	248.35'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 248.35 249.35 Width (feet) 26.00 34.00
#2	Discarded	248.00'	**2.140 in/hr Exfiltration (25 mpi) over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.33 cfs @ 12.11 hrs HW=248.62' (Free Discharge)
└**2=Exfiltration (25 mpi)** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=12.32 cfs @ 12.11 hrs HW=248.62' (Free Discharge)
└**1=Custom Weir/Orifice** (Weir Controls 12.32 cfs @ 1.69 fps)

Summary for Pond 501: New Ludlow Road

Inflow Area = 50,936 sf, 5.99% Impervious, Inflow Depth = 2.99" for 10 Year event
Inflow = 4.06 cfs @ 12.07 hrs, Volume= 12,693 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.06' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 12,693 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 502: Wetlands

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 1.35" for 10 Year event
Inflow = 12.59 cfs @ 12.11 hrs, Volume= 27,087 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.12' @ 19.35 hrs Surf.Area= 217,800 sf Storage= 27,087 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Subcatchment 201: Frontage to New Ludlow Road

Runoff = 6.49 cfs @ 12.07 hrs, Volume= 20,650 cf, Depth= 4.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.50"

Area (sf)	CN	Description
4,811	39	>75% Grass cover, Good, HSG A
4,034	30	Brush, Good, HSG A
39,041	96	Gravel surface, HSG A
3,050	98	Paved parking, HSG A
0	98	Roofs, HSG A
50,936	86	Weighted Average
47,886	85	94.01% Pervious Area
3,050	98	5.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	**186**	**Total, Increased to minimum Tc = 5.0 min**			

Summary for Subcatchment 202: Rear Area to East Wetlands

Runoff = 24.23 cfs @ 12.08 hrs, Volume= 76,038 cf, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.50"

Area (sf)	CN	Description
74,411	30	Brush, Good, HSG A
152,126	96	Gravel surface, HSG A
550	98	Paved parking, HSG A
14,580	98	Roofs, HSG A
241,667	76	Weighted Average
226,537	74	93.74% Pervious Area
15,130	**98**	**6.26% Impervious Area**

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 402: Rear Basin

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 3.78" for 100 Year event
Inflow = 24.23 cfs @ 12.08 hrs, Volume= 76,038 cf
Outflow = 23.60 cfs @ 12.10 hrs, Volume= 76,038 cf, Atten= 3%, Lag= 1.6 min
Discarded = 0.36 cfs @ 12.10 hrs, Volume= 18,155 cf
Primary = 23.25 cfs @ 12.10 hrs, Volume= 57,882 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 248.76' @ 12.10 hrs Surf.Area= 7,245 sf Storage= 4,391 cf

Plug-Flow detention time= 23.5 min calculated for 75,985 cf (100% of inflow)
Center-of-Mass det. time= 23.6 min (839.5 - 815.8)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	1,185 cf	**Sediment Basin (Prismatic)**Listed below (Recalc)
#2	248.00'	1,115 cf	**Sediment Forebay (Prismatic)**Listed below (Recalc)
#3	248.00'	3,962 cf	**Infiltration Basin (Prismatic)**Listed below (Recalc)
		6,262 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	820	0	0
249.00	1,550	1,185	1,185

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	880	0	0
249.00	1,350	1,115	1,115

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	2,650	0	0
249.00	5,273	3,962	3,962

Device	Routing	Invert	Outlet Devices
#1	Primary	248.35'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 248.35 249.35 Width (feet) 26.00 34.00
#2	Discarded	248.00'	**2.140 in/hr Exfiltration (25 mpi) over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.36 cfs @ 12.10 hrs HW=248.76' (Free Discharge)
└**2=Exfiltration (25 mpi)** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=23.05 cfs @ 12.10 hrs HW=248.76' (Free Discharge)
└**1=Custom Weir/Orifice** (Weir Controls 23.05 cfs @ 2.06 fps)

Summary for Pond 501: New Ludlow Road

Inflow Area = 50,936 sf, 5.99% Impervious, Inflow Depth = 4.86" for 100 Year event
Inflow = 6.49 cfs @ 12.07 hrs, Volume= 20,650 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.09' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 20,650 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 502: Wetlands

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 2.87" for 100 Year event
Inflow = 23.25 cfs @ 12.10 hrs, Volume= 57,882 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.27' @ 24.00 hrs Surf.Area= 217,800 sf Storage= 57,882 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Subcatchment 201: Frontage to New Ludlow Road

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,275 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.17"

Area (sf)	CN	Description
4,811	39	>75% Grass cover, Good, HSG A
4,034	30	Brush, Good, HSG A
39,041	96	Gravel surface, HSG A
3,050	98	Paved parking, HSG A
0	98	Roofs, HSG A
50,936	86	Weighted Average
47,886	85	94.01% Pervious Area
3,050	98	5.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0080	0.68		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.9	166	0.0080	1.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.4	186	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 202: Rear Area to East Wetlands

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 2,241 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr Water Quality Rainfall=1.17"

Area (sf)	CN	Description
74,411	30	Brush, Good, HSG A
152,126	96	Gravel surface, HSG A
550	98	Paved parking, HSG A
14,580	98	Roofs, HSG A
241,667	76	Weighted Average
226,537	74	93.74% Pervious Area
15,130	98	6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0150	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
2.6	305	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.0	325	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond 402: Rear Basin

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 0.11" for Water Quality event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 2,241 cf
Outflow = 0.20 cfs @ 12.21 hrs, Volume= 2,241 cf, Atten= 46%, Lag= 8.6 min
Discarded = 0.20 cfs @ 12.21 hrs, Volume= 2,241 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 248.05' @ 12.21 hrs Surf.Area= 4,529 sf Storage= 208 cf

Plug-Flow detention time= 16.7 min calculated for 2,240 cf (100% of inflow)
Center-of-Mass det. time= 16.7 min (897.5 - 880.7)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	1,185 cf	**Sediment Basin (Prismatic)**Listed below (Recalc)
#2	248.00'	1,115 cf	**Sediment Forebay (Prismatic)**Listed below (Recalc)
#3	248.00'	3,962 cf	**Infiltration Basin (Prismatic)**Listed below (Recalc)
		6,262 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	820	0	0
249.00	1,550	1,185	1,185

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	880	0	0
249.00	1,350	1,115	1,115

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	2,650	0	0
249.00	5,273	3,962	3,962

Device	Routing	Invert	Outlet Devices
#1	Primary	248.35'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 248.35 249.35 Width (feet) 26.00 34.00
#2	Discarded	248.00'	**2.140 in/hr Exfiltration (25 mpi) over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.21 cfs @ 12.21 hrs HW=248.05' (Free Discharge)
└**2=Exfiltration (25 mpi)** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=248.00' (Free Discharge)
└**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Summary for Pond 501: New Ludlow Road

Inflow Area = 50,936 sf, 5.99% Impervious, Inflow Depth = 0.30" for Water Quality event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,275 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.01' @ 24.35 hrs Surf.Area= 217,800 sf Storage= 1,275 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

Summary for Pond 502: Wetlands

Inflow Area = 241,667 sf, 6.26% Impervious, Inflow Depth = 0.00" for Water Quality event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 100.00' @ 0.00 hrs Surf.Area= 217,800 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,089,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	217,800	0	0
105.00	217,800	1,089,000	1,089,000

APPENDIX E

OPERATION & MAINTENANCE PLAN

OPERATION & MAINTENANCE PLAN

"Quality Fleet Services, Inc."
SITE DEVELOPMENT
548 New Ludlow Road
South Hadley, MA

June 10, 2015

It is anticipated that Quality Fleet Services, Inc. will retain responsibility for the operation and maintenance of the stormwater system upon completion of construction. An annual budget cost of approximately $1,500 is anticipated for the operation and maintenance of the stormwater system. Until such time, the contractor of the project will be responsible for operation and maintenance.

The contractor selected to complete the site work construction will be responsible for the operation and maintenance of the temporary erosion control measures during construction and the stormwater management system during the construction phase of the project. Erosion control measures shall be installed and maintained as shown on site plans for the project in accordance with details shown on the plan. Erosion control shall be maintained as detailed on the site plans.

The following maintenance and inspection recommendations are taken from DEP's Stormwater Management Technical Handbook and shall become part of the operation and maintenance plan for the stormwater management system located on the site:

All stormwater management devices shall be thoroughly cleaned immediately after any spill which may occur on site.

All stormwater management components shall be inspected on a monthly basis during the first six months of operation after the completion of construction. At least three monthly inspections of the stormwater management system must take place during the first growing season after the completion of construction.

Infiltration Basin: Once the infiltration system goes on-line, inspections shall occur after every major storm for the first six months to ensure proper stabilization and function. Standing water in the basin 48 to 72 hours after the storm indicates the infiltration capacity may be compromised due to clogging of the soil. Sediment shall be removed as necessary to maintain infiltration and capacity of the components.

After the initial six month period, the infiltration basin shall be inspected at least twice per year. Items to check include standing water, differential settlement, erosion, and sediment accumulation.

Sediment shall be removed from the infiltration basin as necessary. Removal procedures should not take place until the infiltration basin is thoroughly dry

At least twice per year, the buffer area, side slopes, and basin bottom shall be mowed. Grass clippings and accumulated organic matter shall be removed to prevent the formation of an impervious organic mat. Trash and debris shall also be removed at this time. Deep tilling can be used to break up a clogged surface area. Any tilled areas on the slopes of the swale shall be revegetated immediately.

The infiltration basin, sediment forebay, and sediment basin are each equipped with a sediment indicator pad. At the time of inspection, the inspector shall locate the pads by probing the bottom of the basin and sediment shall be removed when 1 inch of sediment covers the indicator pad. Sediment shall be removed across the basin to 1 inch below the level of the indicator pad. Removal procedures should not take place until the floor of the basin is thoroughly dry. Light equipment, which will not compact the underlying soil, should be used to remove the top layer. The remaining soil should be deeply tilled, and revegetated as soon as possible.

Mosquito Prevention and Control: Clear debris and vegetation from the roof leader connections and the general site area to limit standing pools of water. Larvicides shall be applied as necessary to the catch basins and infiltration basin if ponding remains over 72 hours. All larvicides shall be applied by a licensed pesticide applicator and in compliance with all pesticide label requirements. The larvicide Bacillus sphaericus *(Bs)* or approved equal shall be hand broadcast during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless the product used can withstand extended dry periods.

Public Safety Features: All differential settlement shall be graded smooth and seeded.

Maintenance Responsibility

A. The owner of the property on which work has been done pursuant to this Ordinance for private stormwater management facilities, or any other person or agent in control of such property, shall maintain in good condition and promptly repair and restore all grade surfaces, walls, drains, dams and structures, vegetation, erosion and sediment control measures and other protective devices. Such repairs or restoration and maintenance shall be in accordance with approved plans.

B. Quality Fleet Services, Inc. will retain responsibility for the operation and maintenance of the stormwater system, the infiltration basin shall be inspected at least twice per year. Items to check include standing water, differential settlement, erosion, and sediment accumulation.

C. A record of installation and a rolling log of operation and maintenance activities shall be retained for a minimum of three years. The log shall be made available to the Authorized Enforcement Agency upon request.

D. Failure to properly maintain practices during and post construction is considered a violation of the stormwater permit.

E. There are no proposed easements associated with the operation of the Stormwater Management System. Quality Fleet Services, Inc. will allow access to the public officials or their agents for inspection of the system at reasonable times.

F. Quality Fleet Services, Inc. will notify the Town of South Hadley Planning Board if the facility were to change ownership to signify the end of their responsibility for operation and maintenance of the facility.

G. Quality Fleet Services, Inc. acknowledges that after notice by the Permit Granting Authority to correct a violation requiring maintenance work, satisfactory correction are not made by Quality Fleet Services, Inc., within thirty days, the Department of Public Works may perform all necessary work to place the facility in proper working condition and place a municipal lien on the affected property as security for all of the cost assumed by the Town to perform the work.

Operator Information

Name(print): _____ Signature: _____

Quality Fleet Services, Inc. Date: 6/15/15

Address: 625 State Street, Belchertown, MA

Telephone: _____

Owner Information

Name(print): Nick Moynihan Signature: _____

The Moynihan Realty Group, LLC Date: 6/15/15

Address: 625 State Street, Belchertown, MA

Telephone: (413) 695 - 3232

South Hadley Planning Board

Signature: _____ Date: _____

"Quality Fleet Services, Inc."

SITE DEVELOPMENT

548 New Ludlow Road

South Hadley, MA

OPERATION AND MAINTENANCE LOG FORM

INSPECTOR:_____ DATE: _____

INSPECTORS QUALIFICATIONS:_____

_____

DAYS SINCE LAST RAINFALL: AMOUNT OF LAST RAINFALL INCHES

STRUCTURAL CONTROLS

BMP	CONDITION	EVIDENCE OF SEDIMENT LEAVING SITE OR CONTROL	NEEDS MAINTENANCE (NOTE BELOW)
SEDIMENT BASIN			
SEDIMENT FOREBAY			
INFILTRATION BASIN			
ADDITIONAL MEASURES RECOMMENDED			
ADDITIONAL MEASURES RECOMMENDED			
ADDITIONAL MEASURES RECOMMENDED			

MAINTENANCE REQUIRED: _____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

APPENDIX F

STORMWATER MANAGEMENT STANDARDS AND CHECK LIST

CALCULATIONS FOR STORMWATER POLICY STANDARDS

"Quality Fleet Services, Inc."
SITE DEVELOPMENT
548 New Ludlow Road
South Hadley, MA

June 10, 2015

STANDARD #1: NO NEW UNTREATED DISCHARGES

No point source discharges have been observed on the site. No point source discharges are proposed.

STANDARD #2: PEAK RATE ATTENUATION

Through the use of the proposed open drainage system and infiltration basin, the proposed development project will not increase peak flows to New Ludlow Road, or to the wetland area east of the property.

STANDARD #3: RECHARGE TO GROUNDWATER

Proposed Infiltration System:

Proposed Impervious area (pavement & buildings) = 18,180 sq. ft.
Impervious area is 100% HSG A, Type A soil
Volume to be recharged: 18,180 sq. ft. x 1 in. x (1/12) = 1,515 cu. ft.

An infiltration rate of 25 min./in. (2.41 in./hour) was used for existing soil at the infiltration basin. For the Water Quality Storm, the proposed drainage calculations (Appendix C of the Drainage Report) show the infiltration basin infiltrates 2,241 cubic feet or 0.0514 acre-feet.

Drawdown within 72-hours, Infiltration Basin:

Recharge Volume (Rv) = 2,241 cu. ft.
Rawls Infiltration Rate (Sandy Loam) = 2.41 inch/hour = 0.2008 ft/hr
Bottom Area = 4,350 sf
Drawdown time = (Rv)(1/Rawls Rate)(1/Bottom Area)
= (2,241 cf) (1/0.2008 ft/hr) (1/4,350 sf)
= 2.6 hours

Mounding Analysis:

Using a Groundwater Mounding Calculator from the website: http://www.aqtesolv.com/forum/rmound.asp ,the following parameters were entered to determine the increase in hydraulic head.

w (Percolation Rate): [(2,241 cf) / (4,350 sf)] / 72 hr. = 0.00716 ft./hr.
K (Hydraulic Conductivity): 2.41 in./hr. = 0.2008 ft./hr.
S (Specific Yield): 0.15
t (Time): 72 hr.
h_i (Initial Saturated Thickness): 3.00 ft.
a (Length of Recharge Area): 100 ft.
b (Width of Recharge Area): 41 ft.

This gives an increase in hydraulic head = 2.53 feet
or a mounding elevation of 247.53 feet.

The analysis indicates the groundwater mounding will not completely saturate the soil below the bottom of the infiltration basin. The infiltration basin will not retain water beyond 72 hours.

STANDARD #4: 80% TSS REMOVAL

Overland flow to infiltration basin

Sediment Basin (25%): (1)(0.25) =	25.0% of TSS
Infiltration System (80%): [(1)-(0.25)(0.80) =	60.0% of TSS
TOTAL:	**85.0% of TSS**

STANDARD #5: HIGHER POTENTIAL POLLUTION LOADS

The proposed facility will be used for vehicle maintenance & repairs. This type of facility is contained in the 12 types listed in the Higher Potential Pollution Loads standard.

STANDARD #6: PROTECTION OF CRITICAL AREAS

This site does not contribute stormwater runoff to a Critical Area.

STANDARD #7: REDEVELOPMENT

The proposed project meets the criteria of new development & redevelopment. The stormwater management has been provided to meet the new development requirements.

STANDARD #8: CONSTRUCTION PERIOD POLLUTION PREVENTION

A Stormwater Pollution Prevention Plan with construction period controls has been prepared for the project and is included in the Project Manual & Drainage Report.

STANDARD #9: OPERATION AND MAINTENANCE PLAN

An Operation and Maintenance Plan has been prepared for the project and is included in the Project Manual & Drainage Report.

STANDARD #10: ILLICIT DISCHARGE COMPLIANCE STATEMENT

Illicit Discharge Compliance Statement:

I hereby certify under the penalties of perjury that no illicit discharges exist on the site. I understand that the pollution prevention plan shall be implemented to prevent illicit discharges to the stormwater management system including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

_____ _____

Signature of Property Owner Date

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.

[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

COMMONWEALTH OF MASSACHUSETTS
DONALD
J. FRYDRYK
CIVIL
No. 35839
REGISTERED
PROFESSIONAL ENGINEER

6/15/15
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.

APPENDIX G

STORMWATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN

"Quality Fleet Services, Inc."

SITE DEVELOPMENT

548 New Ludlow Road
South Hadley, MA

June 10, 2015

Prepared for:

Owner:
The Moynihan Realty Group, LLC
625 State Street
Belchertown, MA 01007

Applicant:
Quality Fleet Services, Inc.
625 State Street
Belchertown, MA 01007

Prepared by:

Sherman & Frydryk, LLC
Land Surveying and Engineering
3 Converse Street, Suite 203
Palmer, MA 01069

"Quality Fleet Services, Inc."

SITE DEVELOPMENT

548 New Ludlow Road
South Hadley, MA

Estimated Project Dates:

Project Start: August 1, 2015

Completion: March 1, 2016

SECTION 1: CONTACT INFORMATION / RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Emergency 24-Hour Contact:

Company: _____

Name: _____

Telephone: _____

Operator:

Company: Quality Fleet Services, Inc.

Name: _____

Address: 625 State Street, Belchertown, MA 01007

Telephone: (413) 695 - 3232

Fax/E-mail: qfservice05@yahoo.com

Area of Control: Entire Property

Operator:

Company: _____

Name: _____

Address: _____

Telephone: _____

Fax/E-mail: _____

Area of Control: _____

Subcontractor:

Company: _____

Name: _____

Address: _____

Telephone: _____

Fax/E-mail: _____

Area of Control: _____

Subcontractor:

Company: _____

Name: _____

Address: _____

Telephone: _____

Fax/E-mail: _____

Area of Control: _____

Subcontractor:

Company: _____

Name: _____

Address: _____

Telephone: _____

Fax/E-mail: _____

Area of Control: _____

Subcontractor:

Company: _____

Name: _____

Address: _____

Telephone: _____

Fax/E-mail: _____

Area of Control: _____

1.2 Stormwater Team:

(Each member must have ready access to the 2012 CGP and Project SWPPP)

Role or Responsibility: _____

Position: _____

Name: _____

Telephone: _____

E-mail: _____

Role or Responsibility: _____

Position: _____

Name: _____

Telephone: _____

E-mail: _____

Role or Responsibility: _____

Position: _____

Name: _____

Telephone: _____

E-mail: _____

Role or Responsibility: _____

Position: _____

Name: _____

Telephone: _____

E-mail: _____

Role or Responsibility: _____

Position: _____

Name: _____

Telephone: _____

E-mail: _____

SECTION 2: SITE EVAUATION, ASSESSMENT, AND PLANNING

2.1 Project/site Information:

Project/Site Name: Quality Fleet Services, Inc.

Project Street/Location: 548 New Ludlow Road, South Hadley, MA

Project Latitude / Longitude:
Latitude: 42.21666 N (Decimal) Longitude: 72.55750 W (Decimal)

Method for determining latitude/longitude: Mass GIS

Horizontal Reference Datum: NAD 83

Project located in Indian country lands or has a significance to and Indian tribe? No

Tribe Name: _____

2.2 Discharge Information:

Project/site discharge into a Municipal Separate Storm Sewer System (MS4)? No

Are construction disturbances within 50 feet of any surface waters? Yes

Receiving Waters: Stony Brook to Connecticut River

Impaired Waters / TMDLs: Bacteria / 9

Tier 2, 2.5, or 3 Waters: None

2.3 Construction Activity:

General Description of Project

The site improvements include the construction of a 14,580 square foot maintenance building, a small paved parking area for office staff, and a second driveway entrance. The driveway entrances will be constructed with a paved apron to the limit of the right of way. The site will remain gravel outside of the proposed building with 4-foot concrete aprons at the overhead door locations. This project will also include the construction of an open channel drainage system with a sediment basin, sediment forebay, and infiltration basin for stormwater mitigation. During the more severe storms, any overflow from the infiltration system will discharge overland toward the wetlands east of the property.

The soil disturbing activities will include: installing perimeter and other erosion and sediment controls; excavation for infiltration basin; paving; and preparation for final planting and seeding.

Size of Construction Project

Property Area: 6.71 Acres

Disturbance Area: 5.00 Acres

The project will not require phased construction

Estimated Project Start: August 1, 2015

Estimated Completion: March 1, 2016

2.4 Timeline of Activities:

Estimated Timeline	Construction Activity and BMP Description
8/1/15 – 8/15/15	Prior to Site Disturbance 1. Install sediment controls as shown on design plans. 2. Install stabilized construction entrance. 3. Construct temporary sediment basins.
8/15/13 – 9/01/15	Site Grading 1. Clear and grub pavement and building area. 2. Establish staging and stockpile area 3. Sediment basin construction. 4. Disturbed areas where construction will cease for more than 14 days will be stabilized with erosion controls.
9/01/15 – 10/15/15	Infrastructure 1. Install temporary sanitary facilities and dumpsters 2. Install storm drains and infiltration basin
9/15/15 – 10/01/15	Building Construction 1. Construct temporary concrete washout area 2. Foundation construction. 3. Structure erection. 4. Remove concrete washout area. 5. Driveway paving and building exterior finish.
10/01/15 – 3/01/16	Final Stabilization and Landscaping 1. Remove all temporary control BMPs and stabilize any areas disturbed by the removal with erosion controls. 2. Remove accumulated sediment in detention basin 3. Final grading and seeding. Monitor stabilized areas until final stabilization is reached.

2.5 Allowable Non-Stormwater Discharges

List of Allowable Non-Stormwater Discharges Anticipated at the Site

1. Discharges from emergency fire-fighting activities.

2. Landscape irrigation.
3. Waters used to wash vehicles and equipment.
4. Water used to control dust.
5. Routine external building wash down.
6. Uncontaminated air conditioning or compressor condensate.
7. Construction dewatering water.

2.6 Site Maps

See the Design Plans for erosion control placement and details.

SECTION 3: COMPLIANCE DOCUMENTATION WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

The project area is not within a Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife, as shown on the Oct. 2008, Massachusetts Natural Heritage Atlas, 13th Edition (see Appendix K).

3.2 Historic Preservation

The project involves ground disturbing stormwater controls on the site. The previous earth work has not uncovered any evidence of historic properties within the proposed area of work.

3.2 Safe Drinking Water Act Underground Injection Control Requirements

This project will not include any underground injection practices. The building gutters will be connected to the infiltration basin by roof leaders.

SECTION 4: EROSION AND SEDIMENT CONTROLS

4.1 Natural Buffers or Equivalent Sediment Controls

All of the proposed disturbance will be limited to outside the bordering vegetated wetland east of the parcel. The proposed project will include 16,360 square feet of disturbance within the 50-foot offset from the limit of the bordering vegetated wetland.

4.2 Sediment Controls

Proposed hay bale/silt fence barriers shall be installed at the limit of work prior to any construction activities at the site.

1. All stockpiles and stockpile areas shall be surrounded by erosion control barriers.

2. All stock piles and disturbed portions of the site where construction activities cease for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area.
3. Disturbed areas of the site where construction activities are completed shall be stabilized with permanent seed no later than 14 days after the last construction activity.
4. Temporary earth dikes and/or trenches shall be constructed along fill slopes to temporarily divert runoff towards temporary sediment basins until pavement construction is stabilized.
5. Accumulated sediment shall be removed as required to maintain basin volumes and infiltration capacities. Accumulated sediment shall also be removed upon stabilization of the site.
6. Anti-tracking pads shall be installed at the construction entrance as required.
7. Sediment barriers shall be installed at each inlet grate and pipe inlet.
8. No stockpiles of materials will be allowed in wetland buffer zones.
9. Temporary sediment traps must dewater within 72 hours after precipitation. Because these traps are subject to high silt loads and tend to clog, treat them with the larvicide Bacillus sphaericus (*Bs*) or approved equal using a licensed pesticide applicator after it rains from June through October, until the first frost occurs.

4.2 Post Construction Stormwater Management

It is anticipated that Quality Fleet Services, Inc. will retain responsibility for the operation and maintenance of the stormwater system upon completion of construction. An annual budget cost of approximately $1,500 is anticipated for the operation and maintenance of the stormwater system. Until such time, the contractor of the project will be responsible for operation and maintenance.

The contractor selected to complete the site work construction will be responsible for the operation and maintenance of the temporary erosion control measures during construction and the stormwater management system during the construction phase of the project. Erosion control measures shall be installed and maintained as shown on site plans for the project in accordance with details shown on the plan. Erosion control shall be maintained as detailed on the site plans.

The following maintenance and inspection recommendations are taken from DEP's Stormwater Management Technical Handbook and shall become part of the operation and maintenance plan for the stormwater management system located on the site:

All stormwater management devices shall be thoroughly cleaned immediately after any spill which may occur on site.

All stormwater management components shall be inspected on a monthly basis during the first six months of operation after the completion of construction. At least three monthly inspections of the stormwater management system must take place during the first growing season after the completion of construction.

Infiltration Basin: Once the infiltration system goes on-line, inspections shall occur after every major storm for the first six months to ensure proper stabilization and function. Standing water in the basin 48 to 72 hours after the storm indicates the infiltration capacity may be compromised

due to clogging of the soil. Sediment shall be removed as necessary to maintain infiltration and capacity of the components.

After the initial six month period, the infiltration basin shall be inspected at least twice per year. Items to check include standing water, differential settlement, erosion, and sediment accumulation.

Sediment shall be removed from the infiltration basin as necessary. Removal procedures should not take place until the infiltration basin is thoroughly dry.

At least twice per year, the buffer area, side slopes, and basin bottom shall be mowed. Grass clippings and accumulated organic matter shall be removed to prevent the formation of an impervious organic mat. Trash and debris shall also be removed at this time. Deep tilling can be used to break up a clogged surface area. Any tilled areas on the slopes of the swale shall be revegetated immediately.

The infiltration basin, sediment forebay, and sediment basin are each equipped with a sediment indicator pad. At the time of inspection, the inspector shall locate the pads by probing the bottom of the basin and sediment shall be removed when 1 inch of sediment covers the indicator pad. Sediment shall be removed across the basin to 1 inch below the level of the indicator pad. Removal procedures should not take place until the floor of the basin is thoroughly dry. Light equipment, which will not compact the underlying soil, should be used to remove the top layer. The remaining soil should be deeply tilled, and revegetated as soon as possible.

Mosquito Prevention and Control: Clear debris and vegetation from the roof leader connections and the general site area to limit standing pools of water. Larvicides shall be applied as necessary to the catch basins and infiltration basin if ponding remains over 72 hours. All larvicides shall be applied by a licensed pesticide applicator and in compliance with all pesticide label requirements. The larvicide Bacillus sphaericus *(Bs)* or approved equal shall be hand broadcast during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless the product used can withstand extended dry periods.

Public Safety Features: All differential settlement shall be graded smooth and seeded.

This plan shall be followed upon completion of construction at the site.

SECTION 5: POLLUTION PREVENTION STANDARDS

5.1 Potential Sources of Pollution

Potential sources of sediment to stormwater runoff:

- Clearing and grubbing operations
- Grading and site excavation operations
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping operations

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Combined Staging Area—small fueling activities, minor equipment maintenance, sanitary facilities, and hazardous waste storage.
- Materials Storage Area—general building materials, solvents, adhesives, paving materials, paints, aggregates, trash, and so on.
- Construction Activity—paving, curb/gutter installation, concrete pouring/mortar/stucco, and building construction
- Concrete Washout Area

Construction Site Pollutants

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site** (or reference SWPPP site map where this is shown)
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Pesticides (insecticides, fungicides, herbicides, rodenticides)	Herbicides used for noxious weed control
Fertilizer	Nitrogen, phosphorous	Newly seeded areas
Plaster	Calcium sulphate, calcium carbonate, sulfuric acid	Building construction
Cleaning solvents	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	No equipment cleaning allowed in project limits
Asphalt	Oil, petroleum distillates	Pavement and roofing
Concrete	Limestone, sand, pH, chromium	Building construction
Glue, adhesives	Polymers, epoxies	Building construction
Paints	Metal oxides, stoddard solvent, talc, calcium carbonate, arsenic	Building construction
Curing compounds	Naphtha	Curb and gutter
Wood preservatives	Stoddard solvent, petroleum distillates, arsenic, copper, chromium	building construction
Hydraulic oil/fluids	Mineral oil	Leaks or broken hoses from equipment
Gasoline	petroleum hydrocarbon Benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment/staging area

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site** (or reference SWPPP site map where this is shown)
Diesel Fuel	Petroleum distillate, oil & grease, naphthalene, xylenes	Secondary containment/staging area
Kerosene	Coal oil, petroleum distillates	Secondary containment/staging area
Antifreeze/coolant	Ethylene glycol, propylene	Leaks or broken hoses from equipment
Sanitary toilets	Bacteria, parasites, and viruses	Staging area

5.1 Hazardous Waste

The applicant shall store all hazardous materials within the building.

All hazardous waste materials will be disposed of in the manner specified by local or State regulations or by the manufacturer. Site personnel will be instructed to proper disposal methods and of proper reporting methods should a spill occur.

All on-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum projects will be stored in tightly sealed containers, which are clearly labeled. No refueling of vehicles or equipment will take place within the buffer zone or 50 feet of any stormwater inlet.

5.2 Snow and Snowmelt Management

Any stockpiling of snow shall be staged in a pervious surface area outside of the pavement area that will drain the melt water from the stockpile into the soil or directly to the catch basin or sediment basin. No stockpiling of snow will be allowed in the infiltration basin directly. Avoid disposing of snow on top of catch basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding.

Disposal sites shall be selected before the winter begins. A silt fence or equivalent barrier should be placed securely on the down gradient side of the snow disposal site. Debris should be cleared from the site prior to using the site for snow disposal. Debris should be cleared from the site and properly disposed at the end of the snow season and no later than May 15.

To prevent increased pollutant concentrations in stormwater discharges, the amount of deicing materials applied should be minimized. Alternative materials, such as sand or gravel, should be used when possible. Any on-site stockpiling of deicing materials shall be properly stored under cover outside the wetland buffer zone.

SECTION 6: INSPECTION AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Inspection Personnel:

Name: _____ Telephone: _____

Company: _____

Address: _____

Qualifications: _____

_____

Name: _____ Telephone: _____

Company: _____

Address: _____

Qualifications: _____

_____

6.2 Inspection and Maintenance Practices

1. All erosion control measures shall be inspected at least once per week, as well as before and following any storm event of 0.5 inches of rainfall or greater.
2. All erosion control measures will be maintained in good working order. Any required repairs would be completed within 24 hours of notice of such.
3. Built up of sediment will be removed from silt fence/hay bale barriers when it reaches one-third height of fence.
4. Sediment fences/hay bale barriers: When inspections find standing pools of water beyond the 24-hour period after a storm, take action to restore barrier to its normal function.
5. Catch Basin Inlets: Inspect and refresh filter fabric, hay bales, filter socks or stone dams on a regular basis to ensure that any stormwater ponded at the inlet drains within 8 hours after precipitation stops. Treat catch basin sumps with the larvicide Bacillus sphaericus (*Bs*) or approved equal using a licensed pesticide applicator.
6. Temporary earth dikes and trenches will be inspected for any signs of excessive erosion or for breaches.
7. Temporary check dams will be inspected on a regular basis to ensure that any stormwater ponded behind the check dam drains within 72-hours.
8. Temporary and permanent seeding will be inspected for bare spots, washouts and substantial growth.
9. A maintenance inspection report will be made after each inspection.
10. The owner of the site will be responsible for selecting the individual responsible for inspections, maintenance and repair activities and for completion of inspection reports.

RETENTION OF RECORDS

As part of the permit, the owner and contractor shall retain copies of this plan, all reports and data generated by this plan and the general permit for a period of at least three years from the date of completion of construction.

The owner shall retain a copy of this SWPPP and EPA NOI form at his office at all times from the date of filing the NOI until the completion of construction. The contractor shall retain a copy of this SWPPP and EPA NOI form at the site and at his office at all times from the date of filing the NOI until the completion of construction.

SECTION 7: TRAINING

Instructions (see CGP Part 6 and 7.2.13):

Table 7-1: Documentation for Completion of Training

Name	Date Training Completed

SECTION 8: CERTIFICATION AND NOTIFICATION

Pollution Prevention Plan Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signed_____ Date:_____

Donald J. Frydryk, P.E., P.L.S.
Sherman & Frydryk, LLC

Owner Certification:

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signed _____ Date: _____

Print _____

General Contractor Certification:

The following section shall be completed by the General Contractor hired for site work.

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signed _____ Date: _____

Print _____
General Contractor:_____
Responsible For: _____
_____
_____
_____

SWPPP APPENDICES

Appendix A – Site Maps

Appendix B – Copy of 2012 CGP

Appendix C – NOI and EPA Authorization Email

Appendix D – Inspection Form

Appendix E – Corrective Action Form

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Log

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

Appendix L - Historic Properties Documentation

Appendix M - Underground Injection Control

APPENDIX A - SITE MAPS

NOTE: PLEASE REFER TO SITE PLANS FOR EROSION CONTROL DETAILS.

APPENDIX B - COPY OF 2012 CONSTRUCTION GENERAL PERMIT

APPENDIX C - NOI AND EPA AUTHORIZATION EMAIL

APPENDIX D - INSPECTION FORM

"Quality Fleet Services, Inc."

SITE DEVELOPMENT

548 New Ludlow Road
South Hadley, MA

INSPECTION AND MAINTENANCE REPORT FORM

INSPECTOR:_____ DATE:_____

INSPECTORS QUALIFICATIONS:_____

DAYS SINCE LAST RAINFALL: AMOUNT OF LAST RAINFALL INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STABILIZED? (YES OR NO)	STABILIZED WITH	CONDITION
CUT SLOPES					
FILL SLOPES					
STOCKPILES					

STABILIZATION REQUIRED:_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

STRUCTURAL CONTROLS

BMP	CONDITION	EVIDENCE OF SEDIMENT LEAVING SITE OR CONTROL	NEEDS MAINTENANCE (NOTE BELOW)
SEDIMENT/ INFILTRATION BASINS			
EMERGENCY OVERFLOW			
WATTLES			
ADDITIONAL MEASURES RECOMMENDED			
ADDITIONAL MEASURES RECOMMENDED			
ADDITIONAL MEASURES RECOMMENDED			

MAINTENANCE REQUIRED:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

TO BE PERFORMED BY:_____ON OR BEFORE:_____

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

_____
_____
_____
_____
_____
_____

REASONS FOR CHANGES:

_____
_____
_____
_____
_____
_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____**Date:**_____

APPENDIX E

CORRECTIVE ACTION FORM

Date	Corrective Action and BMP Description

APPENDIX F

SWPPP AMENDMENT LOG

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

APPENDIX G - SUBCONTRACTOR CERTIFICATIONS/AGREEMENTS

SUBCONTRACTOR CERTIFICATIONS/AGREEMENTS

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

APPENDIX H - GRADING AND STABILIZATION ACTIVITIES LOG

GRADING AND STABILIZATION ACTIVITIES LOG

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**

APPENDIX I

SWPPP TRAINING LOG

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: _____ Date: _____

Course Length (hours): _____

Stormwater Training Topic: *(check as appropriate)*

- ❑ **Sediment and Erosion Controls**
- ❑ **Emergency Procedures**
- ❑ **Stabilization Controls**
- ❑ **Inspections/Corrective Actions**
- ❑ **Pollution Prevention Measures**

Specific Training Objective:_____

_____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		

APPENDIX J - DELEGATION OF AUTHORITY FORM

DELEGATION OF AUTHORITY

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the ____Quality Fleet Services, Inc._ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix I of EPA's Construction General Permit (CGP), and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix I.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

APPENDIX K - ENDANGERED SPECIES DOCUMENTATION

APPENDIX L - HISTORIC PROPERTIES DOCUMENTATION

APPENDIX M - UNDERGROUND INJECTION CONTROL

APPENDIX H

STORMWATER PERMIT APPLICATION

FORM SWP

SOUTH HADLEY PLANNING BOARD

APPLICATION FOR STORMWATER PERMIT

Date _____

Pursuant to the provisions of Article XVI of the Bylaws of the Town of South Hadley, the undersigned herewith submits the accompanying application for a Stormwater Management Permit as described below and detailed in the supporting documentation, which is incorporated into and made part of this application.

PROJECT/SITE INFORMATION

Project/Site Name: Quality Fleet Services, Inc., Site Re-Development

Project/Site Location (Street Address): 548 New Ludlow Road

Assessor's Map # 8 Parcel # 118 Total Parcel Size (square feet): 292,603 s.f.

Estimated Amount of Area to be Disturbed (square feet): 217,800 s.f.

Total Area of Impervious Surfaces (square feet): Existing: 0 s.f. Proposed: 18,180 s.f.

Date Site Plan, Special Permit, or Definitive Subdivision Plan was approved: _____

General Description of Project Construction of a 14,580 square foot maintenance building.

APPLICANT INFORMATION

Name: Quality Fleet Services, Inc.

Address: 625 State Street, Belchertown, MA

Telephone: (413) 695 - 3232

Email: qfservice05@yahoo.com

OWNER INFORMATION
(if different from Applicant)

Name: The Moynihan Realty Group, LLC

Address: 625 State Street, Belchertown, MA

Telephone: (413) 695 - 3232

Email: qfservice05@yahoo.com

CONSULTING ENGINEER INFORMATION

Name: **Sherman & Frydryk, LLC, Land Surveying and Engineering**

Address 3 Converse Street, Suite 203, Palmer, MA

Telephone (413) 283 – 6210

Email Address: dfrydryk@shermanfrydryk.com

I, as applicant, certify that the application and all attachments are correct and complete.

6/15/15

Signature of Applicant **Date**

FOR PLANNING BOARD OFFICE USE:

Amount of Application Fee: _____ Fee Paid? Yes ____ No ____