EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES
102 Grove Street
Worcester, MA 01605-2629
508-752-9666 / Fax: 508-752-9494

November 29, 2016

Leicester Conservation Commission
Town Hall
3 Washburn Square
Leicester, MA 01524

Re: Notice of Intent, Project Description & Alternatives Analysis

Subject Property: 207 Main Street, Cherry Valley (Leicester)

Dear Commission Members:

Enclosed please find two (2) copies of a Notice of Intent application package ("NOI") with half-size plan sets and three (3) full-size plan sets submitted on behalf of the Applicant: May F. DeJesus. This NOI is filed under the Massachusetts Wetlands Protection Act and the Leicester Wetland Bylaw for the above-referenced property. This filing comprises:

1. This cover letter with site photo at Main Street;
2. Municipal filing fee check including local portion of WPA fee plus bylaw fee of one-half total WPA fee ($762.50);
3. WPA Form 3 Notice of Intent;
4. NOI Wetland Fee Transmittal Form;
5. Certified Abutters List and form of abutter notice;
6. USGS Locus Map;
7. DEP Bordering Vegetated Wetland Field Data Forms by EcoTec, Inc.;
8. Stormwater Documentation by HS&T Group, Inc.;
9. Existing Conditions Plan, Site Plan & Detail by HS&T Group, Inc.; dated November 7, 2016 (3 sheets).

A copy of this filing has been submitted by certified mail, return receipt requested, to the Central Regional Office of the Department of Environmental Protection and to the property owner, as required. Abutters to the project site within 300 feet have been notified by Certificate of Mailing, as required. Proof of mailing will be provided at the time of the first public hearing.

Project/Property Description:

The proposed project consists of renovating an existing commercial/residential structure (within the footprint of the existing structure), constructing a driveway and parking area of minimum size required by local ordinance as well as a grass yard area. A portion of the proposed driveway consists of an existing gravel surfaced area (see attached site photo). A pervious paver system is proposed for the parking lot and driveway. Nearly the entire project area falls within the Outer Riparian Riverfront Area associated with Kettle Brook. An Alternatives Analysis for work in the Riverfront Area may be found below. A portion of the proposed parking area falls within the 100-foot Buffer Zone to Bordering Vegetated Wetland. No work is proposed within the 25-foot Buffer Zone.

Wetland Resource Areas were delineated by Arthur Allen of EcoTec, Inc. on October 13, 2016 and include Bordering Vegetated Wetland (blue flags A-1 to A-32) and the Mean Annual High Water Line of Kettle Brook (red flags RB-1 to RB-12). DEP Bordering Vegetatated Wetland Delineation Data Forms were completed at wetland flag A-4 and are attached to this document. Bordering Land Subject to Flooding occurs on the property but well outside the project limits. There are no Certified Vernal Pools or Rare Species Estimated or Priority Habitats on the property.

Alternatives Analysis:
As work is proposed in the Riverfront Area we offer the following alternatives analysis with information on impact avoidance, minimization and mitigation

As per the Wetlands Protection Act Regulations at 310 CMR 10.58(4)(c) the requirements for alternatives analysis were considered in the design of this project as follows:

- The proposed project will provide the minimum parking area required for the zoned use of the property and existing building. The project will also create a minimal grassed yard area to serve the residents of the building. The lot was created in 1962 and therefore pre-dates the Rivers Act and Regulations;
- The parking lot and yard is located directly adjacent to the business that will utilize it and there are no other adjacent yards or lots which would provide the required parking and driveway area. Consideration of other lots within the municipality is not an option because they do not provide direct access to the proponent's business.
- The lot is constrained by it's existing configuration as well as by the existing gravel parking area, and by the presence of wetlands and associates setbacks. These constraints necessitate the use of a portion of the Riverfront Area which constrains nearly all of the site. Reduction in the size of the project would not allow for the zoned use and redevelopment of the property.

No Significant Adverse Impact:
As per the Wetlands Protection Act Regulations at 310 CMR 10.58(4)(d) the requirements for no significant adverse impact were considered in the design of this project as follows:

- The total proposed Riverfront Area alteration is 6,143 square feet. Redevelopment of the existing, degraded gravel parking area occupies 1,143 square feet. The proposed discretionary alteration of previously undeveloped Riverfront Area is 5,000 square feet as allowed on a property that pre-dates October 6, 1997. All of these areas are identified and tabulated on the Site Plan;
- No alteration is proposed within the 100 foot Inner Riparian Zone;
- The project provides full compliance with the Department of Environmental Protection Stormwater Management Policy as detailed in the Notice of Intent and attachments. Pervious pavement (a Proprietary Best Management Practice) is proposed to control and infiltrate stormwater. Sediment/erosion control and stabilization has been incorporated into the project as detailed on the site plans;
- Important wildlife habitat functions of the Riverfront Area, on the project site, will not be impaired as the proposed Outer Riparian Zone work area is significantly influenced by invasive species and extends between already developed backyards of adjacent properties. All of the most natural and valuable Riverfront Area habitat on the site will be preserved. None of the important habitat features and functions listed at 310 CMR 10.60(2)(e) are present within the project area. There are no Certified Vernal Pools or Rare Species Habitat within the project limits and no potential vernal pools or rare species were noted within the project area during the course of site evaluation and wetland delineation.

We look forward to meeting with the Commission regarding this project. If you have any questions, please feel free to contact me at any time.

Sincerely,

Arthur Allen
Senior Environmental Scientist

cc: DEP-CERO Wetlands & Waterways

AA/NOI/Leicester207Main NOIcover.doc


207 Main Street
Main St
Main St
Gravel parking area at 207 Main Street
Report a privacy concern with this image

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

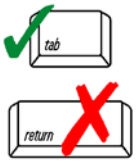
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Leicester
City/Town

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



Note:
Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

207 Main Street — a. Street Address
Leicester — b. City/Town
01611 — c. Zip Code

Latitude and Longitude:
42.242593 — d. Latitude
-71.872329 — e. Longitude

23C — f. Assessors Map/Plat Number
E26 — g. Parcel /Lot Number

2. Applicant:

May — a. First Name
DeJesus — b. Last Name

c. Organization
101 Henshaw Street — d. Street Address
Leicester — e. City/Town
MA — f. State
01524 — g. Zip Code
508-425-9452 — h. Phone Number
i. Fax Number
j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

Jussemar P. — a. First Name
DeJesus — b. Last Name

c. Organization
101 Henshaw Street — d. Street Address
Leicester — e. City/Town
MA — f. State
01524 — g. Zip Code
774-287-5984 — h. Phone Number
i. Fax Number
sse.mar@hotmail.com — j. Email address

4. Representative (if any):

Arthur — a. First Name
Allen — b. Last Name
EcoTec, Inc. — c. Company
102 Grove Street — d. Street Address
Worcester — e. City/Town
MA — f. State
01605 — g. Zip Code
508-752-9666 — h. Phone Number
508-752-9494 — i. Fax Number
aallen@ecotecinc.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

750 — a. Total Fee Paid
362.50 — b. State Fee Paid
387.50 — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

Rennovate an existing commercial/residential building (within the footprint of the building) and construct a parking lot and lawn/yard area.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☒ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Worcester	
c. Book	d. Page Number
55400	175

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Lynde Brook (inland) 1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 25,138 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
6,143	0	6143

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Notice of Intent – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2008
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing.
a. NHESP Tracking # _____ b. Date submitted to NHESP _____

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
1213 Purchase Street – 3rd Floor
New Bedford, MA 02740-6694
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

C. Other Applicable Standards and Requirements (cont'd)

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

2. ☒ A portion of the site constitutes redevelopment

3. ☒ Proprietary BMPs are included in the Stormwater Management System.

b. ☐ No. Check why the project is exempt:

1. ☐ Single-family house

2. ☐ Emergency road repair

3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Site Plan - 207 Main St., Leicester, MA
a. Plan Title

HS&T Group, Inc.
b. Prepared By

Hossein Haghanizadeh, PE
c. Signed and Stamped by

11/7/2016
d. Final Revision Date

1"=20'
e. Scale

Stormwater Documents
f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

19705363446
2. Municipal Check Number

11/29/2016
3. Check date

19705363435
4. State Check Number

11/29/2016
5. Check date

Postal Money Orders
6. Payor name on check: First Name

7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date 11/29/2016
3. Signature of Property Owner (if different)	4. Date 11/29/2016
5. Signature of Representative (if any)	6. Date 11/29/2016

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

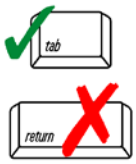
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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



A. Applicant Information

1. Location of Project:

207 Main Street	Leicester
a. Street Address	b. City/Town
19705363435	362.50
c. Check number	d. Fee amount

2. Applicant Mailing Address:

May		DeJesus
a. First Name		b. Last Name

c. Organization

101 Henshaw Street
d. Mailing Address

Leicester	MA	01524
e. City/Town	f. State	g. Zip Code

508-425-9452		mayfdejesus@icloud.com
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

Jussemar P.		DeJesus
a. First Name		b. Last Name

c. Organization

101 Henshaw Street
d. Mailing Address

Leicester	MA	01524
e. City/Town	f. State	g. Zip Code

h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Cat. 2.b. Parking Lot in RFA	1	750	750

Step 5/Total Project Fee:

Step 6/Fee Payments:

Total Project Fee:	750 (a. Total Fee from Step 5)
State share of filing Fee:	362.50 (b. 1/2 Total Fee **less $**12.50)
City/Town share of filling Fee:	387.50 (c. 1/2 Total Fee **plus** $12.50)

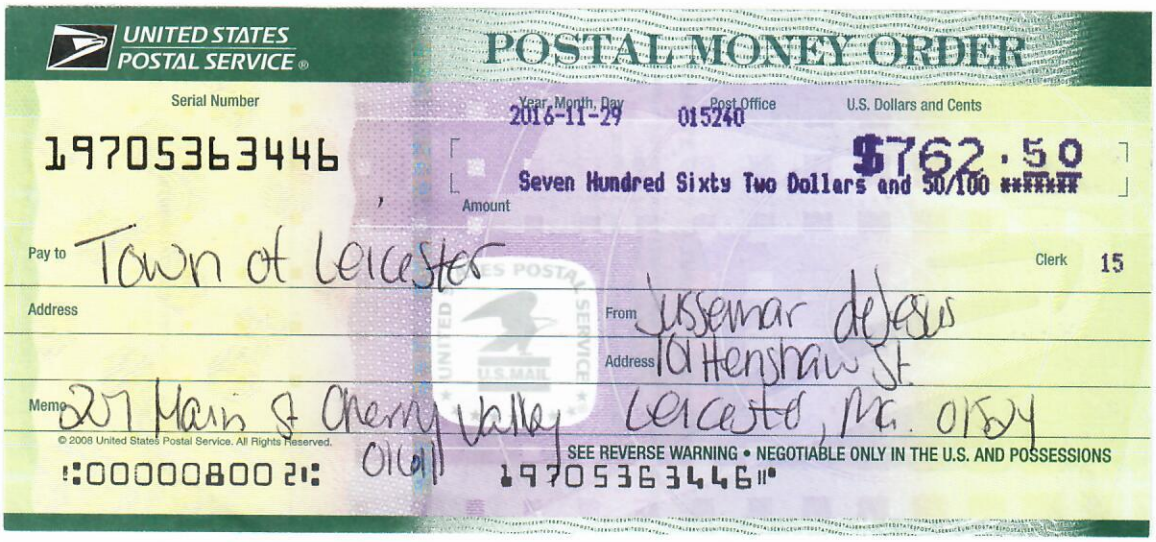
C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)



UNITED STATES POSTAL SERVICE

POSTAL MONEY ORDER

Serial Number: 19705363446

Year, Month, Day: 2016-11-29

Post Office: 015240

U.S. Dollars and Cents: $762.50

Amount: Seven Hundred Sixty Two Dollars and 50/100 ******

Pay to: Town of Leicester

Clerk: 15

Address:

From: Jussemar deJesus

Address: 101 Henshaw St.

Memo: 207 Main St Cherry Valley Leicester, MA. 01524

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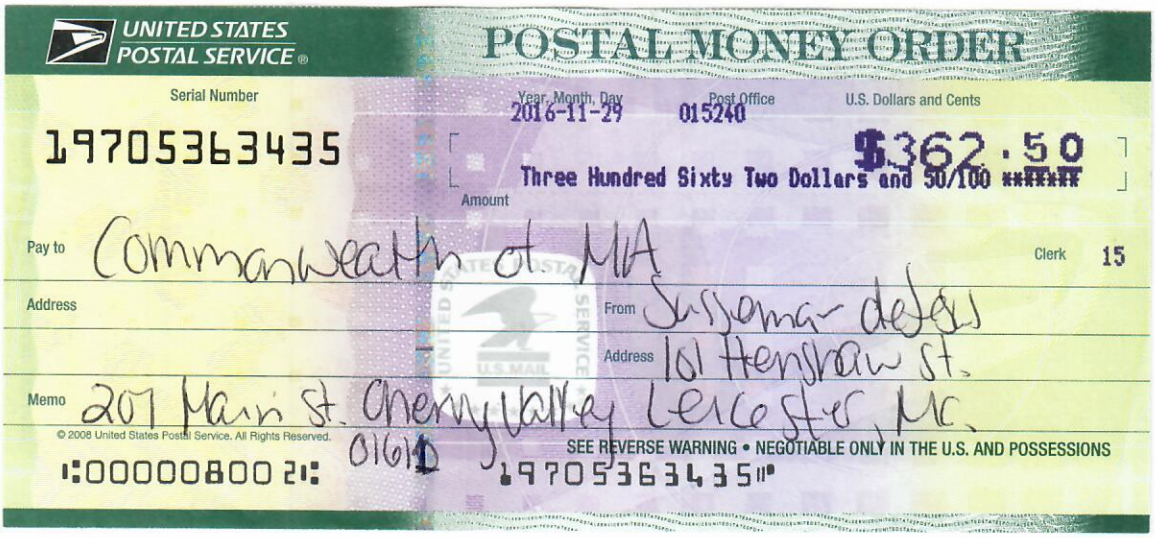
SEE REVERSE WARNING • NEGOTIABLE ONLY IN THE U.S. AND POSSESSIONS

:00000800 21: 01611 19705363446



UNITED STATES POSTAL SERVICE

POSTAL MONEY ORDER

Serial Number: 19705363435

Year, Month, Day: 2016-11-29

Post Office: 015240

U.S. Dollars and Cents: $362.50

Amount: Three Hundred Sixty Two Dollars and 50/100 ******

Pay to: Commanweath of MA

Clerk: 15

Address:

From: Jussemar deJesus

Address: 101 Henshaw St.

Memo: 207 Main St. Cherry Valley Leicester, MA.

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:00000800 21: 01611 19705363435

Town of Leicester

Abutters List

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
23A C14 0	224 MAIN ST	ONEIL JAMES E	ONEIL DOROTHY M	224 MAIN STREET	CHERRY VALLEY	MA	01611
23A C15 0	226 MAIN ST	TOWN OF LEICESTER	FIRE STATION/CHERRY VAL	3 WASHBURN SQUARE	LEICESTER	MA	01524
23B A3 0	210 MAIN ST	MORSE LEE	JOHNSON TIMOTHY THOMA	25 SOUTHBRIDGE ST	AUBURN	MA	01501
23B A4 0	200 MAIN ST	GSTC REALTY LLC	C/O GETTY PROPERTIES C(	TWO JERICHO PLAZA STE 1	JERICHO	NY	11753
23C E12 0	29 BOYD ST	CASTRO MARTHA C	WALKER ROBERT C JR	29 BOYD ST	CHERRY VALLEY	MA	01611
23C E13 0	19 BOYD ST	ROBILLARD DAVID C		33 BOYD STREET	CHERRY VALLEY	MA	01611
23C E14 0	BOYD ST	TOWN OF LEICESTER	TOWN HALL	3 WASHBURN SQUARE	LEICESTER	MA	01524
23C E15 0	WORC GARDEN	ST JOSEPH SCHOOL CORP		49 ELM STREET	WORCESTER	MA	01609
23C E16 0	BOYD ST	RABIDOU KENNETH M		34 DEERFIELD ST	WORCESTER	MA	01602
23C E17 0	NORWAY ST	TURNER JOHN K	TURNER SANDRA O	13 CHURCH ST	CHERRY VALLEY	MA	01611
23C E19 0	13 CHURCH ST	TURNER JOHN K	TURNER SANDRA O	13 CHURCH ST	CHERRY VALLEY	MA	01611
23C E20 0	7 CHURCH ST	GONZALEZ JOSEPH	RAMIREZ KATRINA	7 CHURCH ST	CHERRY VALLEY	MA	01611
23C E23 0	219 MAIN ST	LETOURNEAU WILLIAM P	LETOURNEAU AMBER	219 MAIN ST	CHERRY VALLEY	MA	01611
23C E24 0	215 MAIN ST	EAGER DARLENE		PO BOX 293	LEICESTER	MA	01524
23C E25 0	211 MAIN ST	EAGER DARLENE		PO BOX 293	LEICESTER	MA	01524
23C E27 0	199 MAIN ST	LEMIEUX ROBERT H		199 MAIN STREET	CHERRY VALLEY	MA	01611-3107
23C E28 0	197 MAIN ST	POIRIER MARCEL J	POIRIER MARIE	197 MAIN ST	CHERRY VALLEY	MA	01611
23C E43 0	69 MAIN ST	CHERRY VALLEY PROPERTIES LL		70 JAMES ST	WORCESTER	MA	016O3

End of Report

Above is a certified list of abutters and abutters to abutters within 300 feet of subject.
Subject property: 207 Main Street, Assessors Map 23C-E26-0, Deed Ref. 55400/175
Subject owner(s): Jussemar Dejesus

John Prescott, Principal Assessor

Prepared by: Kathleen Asquith, Assistant

Notification of Abutters Under the
Massachusetts Wetlands Protection Act &
The Town of Leicester Wetland Bylaw

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

A. The name of the applicant is May DeJesus.

B. The applicant has filed a Notice of Intent with the Conservation Commission for the municipality of Leicester seeking permission to renovate an existing building within its footprint and to expand an existing driveway and parking area, nearly all of which is within an Area Subject to Protection Under the Wetlands Protection Act (General Laws Chapter 131, Section 40) and the Leicester Wetland Bylaw.

C. The address where the planned activity will take place is 207 Main Street, Cherry Valley.

D. Copies of the Notice of Intent may be examined and obtained at EcoTec, Inc., 102 Grove Street, Worcester, MA, during regular business hours.

For more information call Arthur Allen at (508) 752-9666, ext. 24 or email him at aallen@ecotecinc.com

This is the applicant's representative.

E. Information regarding the date, time and place of the public hearing may be obtained from EcoTec, Inc., by calling this telephone number (508) 752-9666 during regular business hours.

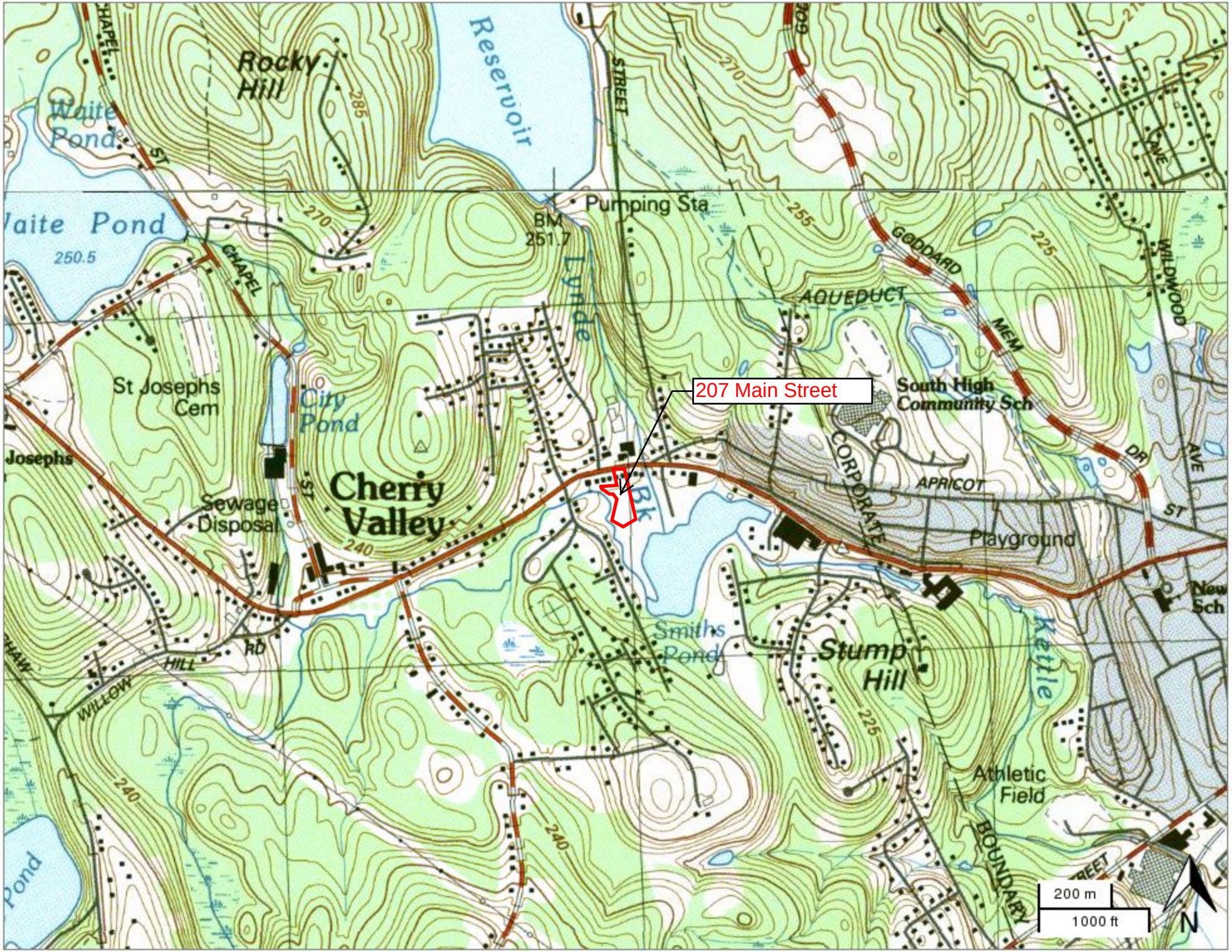
NOTE: Notice of the public hearing, including the date, time and place will be published at least five (5) days in advance in the *Worcester Telegram & Gazette*.

NOTE: Notice of the public hearing, including the date, time and place will be posted in the City or Town Hall not less than forty-eight (48) hours in advance.

NOTE: You also may contact your local Conservation Commission or the nearest Department of Environmental Protection Regional Office for more information about this application or the Wetlands Protection Act. To contact DEP, call:

DEP Central Region: 508-792-7650

USGS


207 Main Street
Rocky Hill
Reservoir
Waite Pond
Pumping Sta
BM 251.7
Lynde
AQUEDUCT
GODDARD MEM
WILDWOOD AVE
St Josephs Cem
City Pond
Cherry Valley
Sewage Disposal
South High Community Sch
CORPORATE DR
APRICOT ST
Playground
Smiths Pond
Stump Hill
Kettle
Athletic Field
BOUNDARY
WILLOW HILL RD
CHAPEL ST
STREET
250.5
270
285
255
225
240
200 m
1000 ft
N

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: EcoTec, Inc. Project location: 207 Main St., Cherry Valley DEP File # :

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indications of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I. Vegetation

Observation Plot Number: UPLAND Transect Number: TPU@A-4 Date of Delineation: 10/13/2016

A. Sample Layer and Plant Species (by common/scientific name)			B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category *
Trees	Red Maple	*Acer rubrum*	40	40	Yes	FAC*
	Butternut	*Juglans cinerea*	20	20	Yes	FACU
	White Pine	*Pinus strobus*	10	10	No	FACU
	White Ash	*Fraxinus americana*	30	30	Yes	FACU
Sapling	Apple	*Malus sp.*	20	50	Yes	NL
	Black Cherry	*Prunus serotina*	10	25	Yes	FACU
	American Elm	*Ulmus americana*	10	25	Yes	FACW*
Shrub	none					
Herb	Poison Ivy	*Toxicodendron radicans*	40	80	Yes	FAC*
	Late Goldenrod	*Solidago altissima*	10	20	Yes	FACU

*Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c. 131, s. 40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusions:

Number of dominant wetland indicator plants: 3 Number of dominant non-wetland indicator plants: 5

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? No

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

1. Soil Survey

Is there a published soil survey for this site? -

title/date: -
map number: -
soil type mapped: -
hydric soil inclusions: -

Are field observations consistent with soil survey? -

Remarks: -

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottle Color
Litter	**2**		
A	**0-5**	**10YR 3/2**	
Au	**5-13**	**10YR 2/1**	
Cu	**13-20**	**5YR 4/6**	

Remarks: **A - Fine sandy loam; Au & Cu - Rubbly sandy loam (old fill)**

3. Other:

Conclusion: Is soil Hydric? **No**

Other Indications of Hydrology: (check all that apply and describe)

- ☐ Site inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☐ Depth to soil saturation in observation hole: _____
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants ≥ number of non-wetland indicator plants	☐	☑
Wetland hydrology present:		
hydric soil present	☐	☑
other indicators of hydrology present	☐	☑
Sample location is in a BVW	☐	☑

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: EcoTec, Inc. Project location: 207 Main St., Cherry Valley DEP File # :

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indications of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I. Vegetation

Observation Plot Number: WETLAND Transect Number: TPW@A-4 Date of Delineation: 10/13/2016

A. Sample Layer and Plant Species (by common/scientific name)			B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category *
Trees	Red Maple	*Acer rubrum*	60	60	Yes	FAC*
	Butternut	*Juglans cinerea*	20	20	Yes	FACU
	White Ash	*Fraxinus americana*	20	20	Yes	FACU
Sapling	Apple	*Malus sp.*	30	75	Yes	NL
	American Elm	*Ulmus americana*	10	25	Yes	FACW*
Shrub	Multi-flora Rose	*Rosa multiflora*	20	66.7	Yes	FACU
	American Elm	*Ulmus americana*	10	33.3	Yes	FACW*
Herb	Poison Ivy	*Toxicodendron radicans*	10	25	Yes	FAC*
	Sensitive Fern	*Onoclea sensibilis*	40	75	Yes	FACW*

*Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c. 131, s. 40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusions:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 4

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? Yes

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

1. Soil Survey

Is there a published soil survey for this site? -

title/date: -
map number: -
soil type mapped: -
hydric soil inclusions: -

Are field observations consistent with soil survey? -

Remarks: -

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottle Color
Litter	**2**		
Oa	**0-10**	**N 2.5/0**	

Remarks: **Oa - muck (histic epipedon)**

3. Other:

Conclusion: Is soil Hydric? **Yes**

Other Indications of Hydrology: (check all that apply and describe)

- ☐ Site inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: **surface**
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants ≥ number of non-wetland indicator plants	☑	☐
Wetland hydrology present:		
hydric soil present	☑	☐
other indicators of hydrology present	☑	☐
Sample location is in a BVW	☑	☐

Submit this form with the Request for Determination of Applicability or Notice of Intent.

H. S. & T. GROUP, INC.
RENEY, MORAN & TIVNAN
BOULEY BROTHERS ENGINEERING

Leicester Conservation Commission
3 Washburn Square
Leicester, Ma 01524
Project Description and the use of Porous Pavement for the Design of Driveway and Parking Areas

The property 207 Main Street is currently classified as one family Bungalow style building. This property is part of Town of Leicester Business (B) Zoning District. The lot has a total area of 25,287 square feet and the total length of its frontage is 66.38 feet. The lot also has wetlands, wetlands buffers, river fronts and river fronts buffer in the rear of the property. Mr. Jussemar Dejesus (applicant) has recently purchased the property, 207 Main Street, from the Lorraine C. Perron (previous owner) and he would like to change the use of the existing building from single-family dwelling to Mixed-Use Development, Vertical Mix, 1-3 Units. According to the Use Regulations table of Leicester Zoning Bylaw, the use of Mixed-Use Development, Vertical Mix, 1-3 Units is allowed in the Business Zoning District.

Mr. Dejesus has proposed to change the use of the second floor of the existing building to 2 apartment units and convert the use of the first floor of the existing building to Business and Professional Office use. The proposed conditions for the Mixed-Use Development for the existing conditions includes renovation of the existing building, associated utility hook-ups, and driveway and parking areas. The total required amount of parking spaces for these uses is 7 parking spaces, with 4 spaces reserved for the 2 apartment units on the second floor and 3 spaces reserved for the offices on the first floor. The location of proposed driveway and parking area is within the 100' river front buffer and 200' river front buffer, and 30' no disturb Bordering Vegetated buffer and 100' bordering Vegetated Buffer. The proposed driveway and parking area will generate a total of 4,776 square feet of pervious area. The total Riverfront area that currently exists on the lot is 25,138 square feet. The proposed conditions of the project is within the wetland buffers and river front buffer; it is imperative that the design that are proposed in the buffer zones are environmentally friendly.

HS&T Group Inc. has proposed to use porous pavement for the design and construction of the proposed driveway and parking area. Porous pavement is a paved surface with a higher than normal percentage of air voids to allow water to pass through it and infiltrate into the subsoil. This porous surface replaces traditional pavement, allowing parking lot, driveway, and roadway runoff to infiltrate directly into the soil and receive water quality treatment. All permeable paving systems consist of a durable, load-bearing, pervious surface overlaying stone bed that stores rainwater before it infiltrates into the underlying soil. Permeable paving techniques include porous asphalt, pervious concrete, paving stones, and manufactured "grass pavers" made concrete or plastic. Permeable paving may be used for walkways, patios, plaza, driveways, parking stalls and overflow parking areas.

The effectiveness of using porous pavement is numerous. Porous pavement provides groundwater recharge and reduces stormwater runoff volume. Depending on design, paving material, soil type and rainfall, porous paving can infiltrate as much as 70-80% of annual rainfall. To qualify for the

Water Quality and Required Recharge Volume, whichever is larger, using the Static Method, and design the system to dewater within 72 hours. Porous pavement may reduce peak discharge rates significantly by diverting stormwater into the ground and away from pipe-and-basin stormwater management systems, up to the volume housed in the storage layer. Porous paving can increase the effective developable area of a site, because the infiltration provided by permeable paving can significantly reduce the need for large stormwater management structures.

HS&T Group Inc. has proposed use a type manufactured grass paver called "Gravelpave 2" for design of the proposed driveway and parking area. Gravelpave 2 is a product of Invisible Structures, Inc. and the benefit of using it for the driveway is quite desirable for the protection of the wetland located in the rear of the property. The use of "Gravelpave 2" is also financially beneficial. The cost of the construction of the proposed driveway is reduced compared to the traditional pavement with stormwater management system. Attached with this letter is the brochure of "Gravelpave 2" provided by Invisible Structures, Inc. Please follow the instructions provided by the manufacturer for installation of "Gravelpave2".

STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN

207 Main Street
Leicester, MA

This Operation and Maintenance (O&M) Plan outlines guidelines and methodologies for the installation and operation of the proposed stormwater management system for this site. This stormwater management system has been designed to operate in accordance with Massachusetts Department of Environmental Protection Stormwater Management Policy.

During construction the Contractor will be responsible for properly installing the proposed stormwater management system. Upon completion of construction, the property owner will be responsible for the long-term maintenance of the stormwater management system for the site.

O&M Activities During Construction

During construction, proper onsite erosion and sedimentation control and accurate installation of the proposed stormwater management system components is necessary. Following proper procedures for the installation of these items will prevent potential issues with the proposed stormwater management system and surrounding areas of the site. To achieve this, the following guidelines should be adhered to by the Contractor during construction for this project:

1. Land disturbance to the site should be kept to a minimum. The phases of development should be planned such that only the land areas actively being developed are altered. All other areas of the site should have natural vegetation preserved, have good temporary ground cover provided or have permanent vegetation established.

2. Disturbed areas of the site should be stabilized. Temporary or permanent structures should be constructed and/or temporary vegetation and mulch or permanent vegetation and mulch should be installed as soon as possible after the land is developed.

3. Disturbed areas of the site should be protected from stormwater runoff. Erosion control devices and stormwater management measures should be installed to prevent water from entering or flowing over disturbed areas. This will also prevent erosion damage to downstream facilities and abutting properties.

4. Perimeter erosion control measures must be installed for the site. These measures should be installed to protect the surrounding areas. Silt fences, haybales, straw wattles and/or silt sacs should be utilized as shown on the Erosion Control Plan for this project.

5. The proposed sediment and erosion control measures should also be used to keep runoff and sediment away from the proposed deep sump catch basin and Cultec subsurface detention and infiltration chambers for this project. These stormwater management components shall not be used as temporary sediment traps during construction.

6. Light earth-moving equipment should be used to excavate the soils in the area where the Cultec subsurface detention and infiltration chamber system will be installed to avoid compaction of the soils beneath this system.

7. During and after excavation, all excavated materials should be placed downstream away from the stormwater management system components to prevent the redeposit of these materials during runoff events. Any surplus excavated materials should be properly handled and disposed of during and after construction.

8. If necessary, temporary dewatering and groundwater control systems should be designed to keep excavations free of water and to avoid disturbance of the subgrade. The flow of all water resulting from pumping of groundwater shall be managed so as not to cause erosion, siltation of the proposed stormwater management system or damage to adjacent properties or resource areas.

9. Care should be taken by the Contractor to prevent earth, water and other materials from entering any existing or proposed drainage piping system. The Contractor should clean the interior of all proposed drainage pipes and structures of dirt and other superfluous material as work progresses. The Contractor should place plugs in the ends of the uncompleted piping system at the end of the work day or whenever work stops. As needed, the drainage pipes between drainage structures should be flushed to remove any collected debris.

10. As soon as possible after the proposed drainage piping system is completed, the Contractor should clean out the drainage pipes and associated structures being careful to prevent soil, water and debris from entering any existing or proposed storm drains, the proposed subsurface infiltration system and any adjacent properties. All debris, mortar, sediment and soil from the bottom of all drainage structures should be removed and disposed of properly. The Contractor should clean and flush the entire stormwater management system prior to final acceptance by the Owner.

During construction it is also essential that the Contractor maintain the proposed erosion control measures as well as the installed stormwater management system components in good condition and proper working order.

Inspection and Maintenance Tasks (During and After Construction)

Onsite Areas

Onsite areas that drain towards the proposed stormwater management system should be inspected to verify that the ground surfaces are stable and that erosion of soils is not occurring. In the event that erosion is occurring, the area should be stabilized against further erosion. This shall be accomplished by placing stable vegetation and/or loam and grass seed or, when necessary, by armoring the area against further erosion with riprap placed on a filter fabric blanket.

Paved Surfaces

Paved surfaces should be inspected for accumulation of sand, litter, eroded soils or other deleterious materials. This inspection should verify that no spills of hazardous materials (such as gasoline or motor oils) have occurred. All trash, junk or any other deleterious materials should be picked up. Upon detecting an accumulation of sand, sediment or other materials, the pavement area should be swept to remove all such materials. Collected pavement sweepings must be disposed of properly. Any material deposits deemed to be hazardous must be removed and disposed of by a licensed contractor.

Catch Basin

Catch basins remain effective at removing pollutants only if they are cleaned out frequently. The proposed catch basin should be inspected and cleaned four (4) times per year. It is recommended that this inspection and cleaning occur at the end of the foliage and snow removal seasons. The inspection and cleaning of the catch basin should also occur whenever the depth of the sediment in the catch basin is greater than or equal to one half the depth of the catch basin. This measurement shall be taken from the bottom of the invert of the lowest pipe in the catch basin. All sediment collected must be disposed of properly. Any material deposits deemed to be hazardous must be removed and disposed of by a licensed contractor.

Stormceptor Unit:

Maintenance of the Stormceptor unit is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The need for maintenance can be determined easily by inspecting the unit from the surface. The depth of oil in the unit can be determined by inserting a dipstick in the oil inspection/cleanout port.

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve. The tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds 8-inches.

Although annual servicing is recommended, the frequency of maintenance may need to be increased or reduced based on local conditions (i.e. if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually).

Oil is removed through the oil inspection/cleanout port and sediment is removed through the riser pipe. Alternatively, oil could be removed from the 24 inch opening if water is removed from the lower chamber to lower the oil level below the drop pipes.

The following procedures should be taken when cleaning out the Stormceptor unit:

1. Check for oil through the oil cleanout port
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to a separate containment tank
4. Remove the sludge from the bottom of the unit using the vacuum truck
5. Refill the Stormceptor with water where required by the Town of Shrewsbury.
6.

Cultec Detention and Infiltration Chamber System

Maintenance and cleaning of the Cultec detention and infiltration chambers shall be performed in accordance with the manufacturer's recommendations as provided in the attached Cultec maintenance information. All sediment collected must be disposed of properly. Any material deposits deemed to be hazardous must be removed and disposed of by a licensed contractor.

The following table lists a suggested maintenance schedule for the site the Contractor should follow during construction for this project:

Erosion & Sediment Control	Inspection	Maintenance Threshold	Maintenance Action
Onsite Street Sweeping	Weekly	When sediment is observed on pavement	Sweep parking area
Silt Fences, Haybales & Straw Wattles	Weekly and after large* storm events	If integrity of the system is compromised	Restore the integrity of the system and/or clean sediment out
Adjacent Roadway	Weekly and after large* storm events	If sediment is greater than 1/2 inch in any area of the paved surfaces	Sweep/clean sediment from street
Subsurface Detention & Infiltration System	Weekly and after large* storm events	When sediment is observed in infiltration basin	Remove sediment in accordance with manufacturer's recommendations

*More than 0.5-inches of rainfall in a 24-hour period

Table 1: O&M Schedule During Construction

Upon the completion of all construction activities, the Contractor is to remove the erosion control measures for the site. In addition, the entire proposed stormwater management system is to be inspected and cleaned by the Contractor. A report of the inspection and cleaning activities shall be forwarded to the Owner. The record keeping should include at a minimum:

- Person or entity performing the activity
- The date of the activity
- The weather conditions
- The site conditions (dry, heavy snow cover, saturated conditions, etc.
- The specific activity performed (inspection, cleaning, etc.)
- The component inspected

- The conditions of the component
- The results of the activity

O&M Activities After Construction Is Completed

The Owner shall be responsible for O&M activities once construction is completed. The following guidelines should be adhered to by the Owner once construction is completed for this project:

1. The parking area for the site should be swept a minimum of two (2) times per year.

2. The stormwater management system should be inspected the first year of operation after large rainfall events (all storms greater than 0.5-inch in a 24-hour period) to verify functionality.

3. The stormwater management system shall be maintained in good working order. The repair of any component of the system should be made as soon as possible to prevent any potential pollutants and/or silt from entering the onsite or offsite drainage system(s) and surrounding land areas.

4. During the winter, snow removal for the site should be managed by the Owner. Snow should be placed on the sides and edges of the proposed parking area. Snow should not be deposited over the proposed catch basin.

5. For the protection of groundwater, the following items are recommended for this site:

    - The use of salt on the pavement and sidewalks should be minimized. Sand or other non-toxic materials should be used where suitable.

    - The use of pesticides, herbicides and fertilizers should be restricted and/or limited.

    - Pet waste should be collected and disposed of properly.

    - The proper storage, use and disposal of the following are encouraged: household hazardous chemicals, tires, yard waste, paint and solvents, automobile fluids and propane tanks.

All post construction maintenance activities should be documented and kept on file by the Owner and made available upon request. The record keeping should include at a minimum:

- Person performing the activity
- The date of the activity
- The weather conditions
- The site conditions (dry, heavy snow cover, saturated conditions, etc.
- The specific activity performed (inspection, cleaning, etc.)
- The component inspected
- The conditions of the component
- The results of the activity

The following table lists a suggested maintenance schedule the Owner should follow after construction is completed for this project:

Sediment Control	Inspection	Maintenance Threshold	Maintenance Action
Street Sweeping	Monthly	When sediment is observed on pavement	Sweep parking area at least two (2) times per year
Subsurface Detention & Infiltration System	Semi-annually and after large* storm events	When sediment is observed in the access manhole(s)	Remove sediment in accordance with manufacturer's recommendations

*More than 3.2-inches of rainfall in a 24-hour period

Table 2: O&M Schedule After Construction Is Completed

The O&M procedures for this development shall be reviewed periodically and changed to meet specific site conditions. In the event that the performance of the stormwater management system for this site becomes inadequate, adjustments to this O&M Plan may become necessary.

Invisible Structures, Inc.
1600 Jackson St., Suite 310
Golden, CO 80401
Toll Free 800-233-1510
Phone 303-233-8383
Fax 303-233-8282
E-Mail sales@invisiblestructures.com
Website www.invisiblestructures.com

June 2013

Gravelpave2 Product Specification (CSI Format)

Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) Format, including *MasterFormat* (1995 Edition), *SectionFormat,* and *PageFormat,* contained in the CSI *Manual of Practice.*

The section must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate with other specification sections and the drawings.

Delete all "Specifier Notes" when editing this section.

SECTION 32 12 43
POROUS FLEXIBLE PAVING
(Formerly 02795 Porous Paving)

Notes: This section covers Gravelpave2 Porous Pavement System from Invisible Structures. The system provides vehicular and heavy load support over gravel areas while protecting the area from rutting and erosion while remaining porous. The major components of the complete system are the Gravelpave2 units, an engineered base course, anchor pins, and gravel fill material.

Consult Invisible Structures, Inc. for assistance in editing this section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Porous pavement system.

1.2 RELATED SECTIONS

A. Section [31 20 00 – Earth Moving] [__ __ __ - _____].
B. Section [33 46 00 – Subdrainage] [__ __ __ - _____].
C. Section [32 10 00 – Bases, Ballasts, and Paving] [__ __ __ - _____].

Notes: Edit the following list as required for the project. List other sections with work directly related to the porous pavement system.

D. Section [32 30 00 - Site Improvements] [__ __ __ - _____].
E. Section [32 90 00 Planting] [__ __ __ - _____].

1.3 REFERENCES

A. ASTM F 1951-08 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

B. ASTM D 638-10 Standard Test Method for Tensile Properties of Plastics

C. ASTM C 33 Standard Specification for Concrete Aggregates

1.4 SYSTEM DESCRIPTION

A. The Gravelpave2 porous pavement system provides vehicular and pedestrian load support for gravel areas and reduces erosion and rutting.

B. Major Components of the Complete System

1. Gravelpave2 units, assembled in rolls.
2. Engineered sand and gravel base course.
3. Anchor pins and washers.
4. Gravel fill aggregate.
5. (Optional) Binder. Consultation suggested with Invisible Structures, Inc.

C. The Gravelpave2 gravel paving units, gravel fill, and base course work together to support imposed loading.

D. The Gravelpave2 paving units contain and restrict gravel fill from lateral and vertical movement.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Shop Drawings: Submit design detail showing proper cross-section.

C. Samples: Submit manufacturer's sample of Gravelpave2 10” x 10” section of Gravelpave2 material.

D. Installation Instructions: Manufacturer’s printed installation instructions. Include methods for maintaining installed products.

E. Certificates:

1. Manufacturer signed certificate stating the product is made in the USA.
2. Submit Material Certificates for base course and gravel fill materials
3. Product certificates signed by the manufacturer certifying material compliance of polyethylene used to make Gravelpave2 units.
4. ISO Certificate certifying manufacturer’s quality management system is currently registered to ISO 9001:2008 quality standards.

F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:

1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
3. Description of Gravelpave2 in stormwater design to limit the disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.
4. Designing elements for Gravelpave2 to limit the disruption and pollution of natural water flows by managing stormwater runoff.
5. Documenting the use of Gravelpave2 to reduce heat islands to minimize the impact on microclimates and human and wildlife habitats.

G. Substitutions: No material will be considered as an equivalent to the Gravelpave2 unit specified herein unless it meets all areas of this specification without exception. Manufacturers seeking to supply what they represent as equivalent material must submit records, data, independent test results, samples, certifications, and documentation deemed necessary by the Specifier to prove equivalency.

H. Manufacturer’s Material Certification: Product manufacturers shall provide certification of compliance with

all applicable testing procedures and related specifications upon written request. Request for certification shall be submitted by the purchasing agency no later than the date of order placement.

I. Product manufacturers shall also have a minimum of 30 years' experience producing products for porous pavement systems.

J. Manufacturer Quality Certification: ISO Certification certifying manufacturer's quality management system for its Gravelpave2 system is currently registered to ISO 9001:2008 quality standards. Any alternate materials submitted shall provide a certification that their porous pavement system manufacturing process is part of an ISO program and a certification will be required specifically stating that their testing facility is certified and in accordance with ISO.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect Gravelpave2 units/rolls from damage during delivery and store rolls upright, under tarp, to protect from sunlight, when time for delivery to installation exceeds one week.

C. Store anchor pins and washers in a secure location protected from theft or damage.

D. Handling: Protect materials during handling and installation to prevent damage.

1.7 MAINTENANCE SERVICE

Notes: Once the gravel fill in in place, the cell wall structure will have minimal visibility when proper care practices are followed.

A. Installer responsible for maintenance of Gravelpave2 system until site work is complete. See *Gravelpave2 Maintenance Guide* from Invisible Structures.

B. System to be maintained by _____, after _____ (completion date or other date).

1.8 Project Conditions

A. Maintain environmental conditions within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not begin installation of porous pavements until all hard surface paving adjacent to porous pavement areas, including concrete walks and asphalt paving, is completed.

C. Install Gravelpave2 units when ambient air temperatures is at least 55 degrees F (13 degrees C).

D. In cold weather, do not use frozen materials or materials mixed or coated with ice or frost, and do not build on frozen base or wet, saturated or muddy subgrade.

E. Protect partially completed paving against damage from other construction traffic when work is in progress.

F. DO NOT DRIVE, PARK ON, or use Gravelpave2 system until system has been properly anchored and fully filled with gravel aggregate fill. Any barricades constructed must still be accessible by emergency and fire equipment during and after installation.

1.9 LIMITED WARRANTY

A. Invisible Structures, Inc. (ISI) warrants to its purchasers that all products furnished by ISI will be free from defects in material and/or workmanship.

B. This warranty shall be extended for a period of five (5) years following the date of shipment by ISI.

C. Providing a written claim is presented to ISI within the warranty period and after inspection by ISI showing the materials have failed under this warranty, all defective materials shall be refurnished under this warranty, at no charge, excluding re-installation costs. This in lieu of all other warranties expressed or implied and is the sole warranty extended by ISI.

D. Our liability under this warranty is limited to the refurnishing of materials and does not include any

responsibility for incidental, consequential, or other damages of any nature.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Invisible Structures, Inc., which is located at: 1600 Jackson St. Suite 310 ; Golden, CO 80401; Toll Free Tel: 800-233-1510; Tel: 303-233-8383; Email: request info (sales@invisiblestructures.com); Web: www.invisiblestructures.com.
B. Substitutions: Not permitted.

2.2 GRAVELPAVE2

A. Composition:
   1. Manufactured in the USA.
   2. High density polyethylene (HDPE): 100 percent recycled materials.
   3. Geotextile fabric backing injection molded to the grid system.
   4. Color: black, terra cotta, gray, or tan. Custom colors may be available – Contact the manufacturer.
   5. Color Uniformity: Uniform color throughout all unit rolls.
   6. Carbon Black for ultraviolet light stabilization.
   7. Anchor pins and washers, provided by manufacturer with Gravelpave2.
B. Performance Properties:
   1. Maximum Loading Capability: 5721 psi (39,273 kPA) when filled with gravel.
   2. Wheelchair Access testing for ADA Compliance: Passing ASTM F 1951-08.
   3. Tensile strength, pull-apart testing: 458 lbf/in from ASTM D638 Modified.
   4. System Permeability (Gravelpave2, sand, base course): 2.63 to 38.55 inches of water per hour.
   5. Effective Imperviousness (E.I.): 10%.
C. Dimensions (individual units are assembled and distributed into rolls):
   1. Roll area: From 108 sq ft (10 sq m) to 538 sq ft (50 sq m), in 108 sq ft (10 sq m) increments
   2. Roll Widths: From 3.3 ft (1 m) to 8.2 ft (2.5 m), in 1.6 ft (0.5 m) increments.
   3. Roll Lengths: From 32.8 ft (10m) to 65.6 ft (20 m), in 3.3 ft (1 m) increments.
   4. Roll Weights: From 41 lbs (19kg) to 205 lbs (93kg), in 41 lbs (19 kg) increments.
   5. Unit Nominal Width by Length: 20 inches by 20 inches (0.5 m by 0.5 m) or 40 inches by 40 inches (1 m by 1 m).
   6. Nominal Depth: 1 inch (2.5 cm) – for rolls and individual units.
   7. Unit Weight: 19 oz (535 g) or 5 lbs. (2.27 kg).
   8. Volume Solid: 8 percent.

2.3 SYSTEM MATERIALS

Notes: All measurements are subject to manufacturing tolerances, unless otherwise specified.

A. Base Course: Sandy gravel material from local sources commonly used for road base construction (recycled materials such as crushed concrete or crushed asphalt are NOT acceptable).
   1. Conforming to the following sieve analysis and requirements:
      a. 100 percent passing sieve size 1 inch (25 mm).
      b. 90-100 percent passing sieve size 3/4 inch (19 mm).
      c. 70-80 percent passing sieve size 3/8 inch (9 mm).
      d. 55-70 percent passing sieve size #4.
      e. 45-55 percent passing sieve size #10.
      f. 25-35 percent passing sieve size #40.

g. 3-8 percent passing sieve size #200.

2. Material may be either "pit run" or "crusher run." Avoid using clay based crusher run/pit run. Crusher run material will generally require coarse, well-draining sand conforming to AASHTO M6 or ASTM C 33 to be added to mixture (20 to 30 percent by volume) to ensure long-term porosity.
3. Alternative materials such as crushed shell, limerock, or crushed lava may be used for base course use, provided they are mixed with sharp sand (20 to 30 percent) to ensure long-term porosity, and are brought to proper compaction. Without added sand, crushed shell and limerock set up like concrete and become impervious.
4. Alternative size and/or composition of base course materials should be submitted to Invisible Structures, Inc. (Manufacturer) for approval.

B. Gravel Fill: Obtain clean, washed, fine decorative gravel, must be sharp and angular (not rounded) stone, granite hardness, to fill the 25 mm (1") high rings and spaces between the rings, not to be overfilled more than 1/4" (6 mm). Maximum Size of stone should be: 3/16" to 3/8" (5 mm to 10 mm) and uniform in size - not graded.

C. Anchors: Typical anchors shall be 8" long nails with "fender" type washers 7 x 30 mm od (5/16" id x 1.25") od, all galvanized metal or similar corrosion resistant coating. Supplied anchors may vary in size and type based on source and availability.

D. (Optional) Binder: Portland cement, polymer binders, or tree resin binders may be added for additional aggregate stabilization. Contact the manufacturer. ATTENTION: Binders will reduce porosity –and some will even eliminate porosity – in the Gravelpave2 system.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine subgrade and base course installed conditions. Do not start porous paving installation until unsatisfactory conditions are corrected. Check for improperly compacted trenches, debris, and improper gradients.

B. For fire lane installations: prior to installing base course, obtain approval of local fire authorities of sub-base.

Notes: For Fire lanes and emergency access, It is recommended that Fire Department inspectors be scheduled to inspect installation of Gravelpave2 during preparation of the subbase, installation of the base course, and installation of Gravelpave2 units. Most small projects can accommodate these inspections all on the same day. Verify with Fire Department if certificates of inspection are required.

C. Start of installation constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found unsatisfactory, contact Architect for resolution.

3.2 PREPARATION

Notes: Ensure that subbase materials are structurally adequate to receive designed base course, wearing course, and designed loads. Generally, excavation into undisturbed normal strength soils will require no additional modification. Fill soils and otherwise structurally weak soils may require modifications, such as geotextiles, geogrids, and/or compaction (not to exceed 90%). Ensure that grading and soil porosity of the subbase will provide adequate subsurface drainage

A. Subgrade Preparation:

1. Prepare subgrade as specified in Section 32 10 00. Verify subgrade in accordance with porous paving system manufacturer's instructions.
2. Proper subgrade preparation will enable the Gravelpave2 rolls/units to connect properly and remain level and stationary after installation.
3. Excavate area allowing for unit thickness, the engineered base depth (where required), and 0.5 inch (1.25 cm) for 0.25 inch (6mm) gravel overfill and slight recession to contain gravel.
4. Provide adequate drainage from excavated area if area has potential to collect water, when

working with in-place soils that have poor permeability.

5. Ensure in-place soil is relatively dry and free from standing water.
6. Uniformly grade base.
7. Level and clear base of large objects, such as rocks and pieces of wood.

B. Base Preparation:

1. Install Base as specified in Section 32 10 00. Verify engineered base (if required) is installed in accordance with porous paving system manufacturer's instructions.
2. Coordinate base installation and preparation with subdrains specified in Section 33 46 00.
3. If required, place a geotextile separation layer between the natural ground and the 'engineered base'.
4. If required, install the specified sub-drain and outlet according to construction drawings.
5. Place engineered base in lifts not to exceed 6 inches (150 mm), compacting each lift separately to 95 percent Modified Proctor.
6. Leave 1 inch (2.5 cm) of depth below final grade for porous paver unit and sand fill and 0.5 inch (1.25 cm) for overfill of gravel aggregate.

Notes: Delete requirement for on-site manufacturer's field representative if not required

3.3 ON-SITE MANUFACTURER'S FIELD REPRESENTATIVE

A. A qualified Manufacturer's field representative shall be available for a pre-construction meeting via phone or in person and will provide installation videos, design details, installation instructions, and the technical specifications.

B. The time for on-site observation shall be indicated in the Contract Documents and included in the base bid price.

3.4 GRAVELPAVE2 INSTALLATION

A. Install the Gravelpave2 units by placing units with rings facing up/fabric below, and using small male/female connectors provided along each edge to maintain proper spacing and interlock the units. Cutting can be performed with pruning shears and knife, or portable power saw. Units shall be anchored to the base course, using anchors described above, as required to secure units in place from movement by traffic, at an average rate of 6 pins per square meter (high speed, heavy vehicles, fast turning movement will require additional anchors). Tops of rings shall be flush with the surface of adjacent hard surfaced pavements.

B. Smooth the fabric overlaps from one roll or unit to the adjacent unit. Take care to make sure there are no gaps in the fabric exposing base course.

C. Install gravel into rings after the units are anchored by "backdumping" directly from a dump truck, or from buckets mounted on tractors, with a minimum depth of 6", then exit the site by driving forward over rings already filled. Sharp turning of vehicles on bare rings must be avoided. The gravel is then spread laterally from the pile using power brooms, blades, flat bottomed shovels and/or wide "asphalt rakes" to fill the rings. A stiff bristled broom should be used for final "finishing". The gravel should be "compacted", if necessary, by using a vibrating plate or small roller, with the finish grade no less than the top of rings and no more than 6 mm (0.25") above top of rings.

D. (Optional) If a binder for fill stone is desired (due to traffic speed, concentrated water flow, or other reason), use one of the following methods:

1. Portland cement: Mixed dry at 10% by weight with fill stone,. Place into rings after thoroughly wetting the base, then lightly mist the surface after fill and compaction. Then, cover with a water resistant tarp, or plastic sheeting material for a minimum period of 3 days, or until the mixture has bonded.
2. Polymer Resin Binder or Tree Resin Binder: Please contact Invisible Structures, Inc. and Resin Manufacturer for installation.

3.7 PROTECTION

A. Prohibit traffic on the Gravelpave2 system until installation is completed. Any traffic on the unfilled or un-anchored Gravelpave2 system is a safety risk and subject to irreparable damage to the product.

3.8 FIELD QUALITY CONTROL

A. Remove and replace segments of Gravelpave2 units where three or more adjacent rings are broken or damaged, reinstalling as specified, so no evidence of replacement is apparent.
B. Perform cleaning during the installation of work and upon completion of the work. Remove all excess materials, debris, and equipment from site. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

3.9 MAINTENANCE

A. Keep area free of and remove organic material such as soil runoff, tree leaves, fruit, and other vegetation debris.
B. Broom or rake gravel smooth to no more than 6mm (0.25”) above the rings.
C. Refill areas with gravel aggregate where walls of the rings are more than 3mm (0.125”) exposed.
D. When snow removal is required, keep a metal edged plow blade a minimum of 17mm (0.75”) above the gravel surface during plowing operations to avoid causing damage to the Gravelpave2 units, or
    1. Use a plow blade with a flexible rubber edge, or
    2. Use a plow blade with skids on the lower outside corners set so the plow blade does not come in contact with the units.

END OF SECTION


Grasspave2
Gravelpave2
UPDATED!
Higher Compressive Strength
15,940 psi • 2.29 million psf
109,906 kPa Tested 3/2015

Introduction

History of Porous Paving

Pebbles, cobblestones, and wood decking structures have been used since the dawn of civilization to reinforce where we walk and the roads we use. Little did we realize that these methods had benefits over the modern trends of sealing up the ground with asphalt and concrete. Porous, permeable or pervious paving—whatever you prefer—became a method for addressing stormwater issues in the early 20th century. Concrete turfblock for grass paving began in the mid-1940s and plastic versions were invented in the late '70s and early '80s. Great advancements have occurred in pervious concrete, pervious asphalt, and other permeable surfaces. We introduced Grasspave^2 in 1982, improving upon these earlier concepts. In 1993, Gravelpave^2 was unveiled, the only product specifically developed for gravel porous paving. Fast forward to this millennium, and Grasspave^2 and Gravelpave^2 are considered by most, the finest porous pavers developed.

Grasspave^2 large rolls and Gravelpave^2 large rolls (not shown) install quickly and conform to the contours of the ground.

Infiltration

Porous paving allows rainwater to percolate through the pavement's surface and back into the ground (infiltrating), where the water is cleaned and returned to ground water supplies. Porous paving improves upon impermeable surfaces, such as concrete or asphalt, which do not allow for this natural filtration. Rain collects airborne and surface pollutants such as sediment, brake dust, chemicals, vehicle exhaust, oil, salts, fertilizers, bacteria, and animal waste. On impermeable surfaces the polluted rainwater runoff (non-point source pollution) is collected, concentrated, and discharged to downstream waters such as streams, reservoirs, and lakes—our drinking water. This runoff also harms vegetation and wildlife with increased water volumes, velocities, and higher temperatures. The Grasspave^2 and Gravelpave^2 systems protect against this dangerous runoff by processing and cleaning the water, thus safeguarding the natural water cycle.

State of the Earth

Invisible Structures, Inc. has developed an entire line of products to address stormwater and environmental concerns. Rainstore^3, Slopetame^2, Draincore^2, and Beachrings^2 can work in addition to, or in conjunction with, Grasspave^2 and Gravelpave^2 to provide your site, home, or office with stormwater and environmental enhancements. Our products can store and collect rain, provide erosion and sediment control, efficiently convey and deliver water, and protect natural areas.

Advanced Technology

The Grasspave^2 and Gravelpave^2 systems are based on a simple, but impressive technology—a series of rings (cylinders) connected on a flexible grid system. The cylinders are engineered to withstand significant structural loads and the grid provides stability, flexibility, and continuity for large areas. The grid system also has the unique ability to be rolled up for easy shipping, handling and installation.

This engineered design allows for any street-legal vehicle (and sometimes larger) to park or drive on our Grasspave^2 or Gravelpave^2 surfaces. The point load pressure is transferred from the top of the ring, through the fill material and cylinders, to the engineered base course.

Wallace Residence, Savannah, GA—Gravelpave^2 creates a wheelchair-accessible surface by stabilizing gravel and supporting tire pressure. 7% dry cement was mixed with gravel before filling rings. Cover photo: Westin Kierland Resort and Spa, Scottsdale, Arizona—Grasspave^2 fire lane and Gravelpave^2 fire lane (concrete widening).

Pentagon Remote Delivery Facility, Arlington, VA—Grasspave^2 was selected for the helicopter landing pads (the four grass squares in center) on the largest "green roof" east of the Mississippi.

The ring and grid structure is 92 percent void space allowing for the healthiest root zone for grass (in Grasspave²) and more decorative gravel (in Gravelpave²) for some of the most attractive paved surfaces around. Less plastic means more natural looking surfaces. This technology also makes for better runoff coefficients and better percolation rates.

120 psi Maximum on Public Highways!

Even empty, Grasspave² and Gravelpave² will support 2,100 psi (14,470 kPa)—well over the 120 psi

UPDATED!
Higher Compressive Strength
15,940 psi • 2.29 million psf
109,906 kPa Tested 3/2015

The heavier a vehicle, the more axles and tires it needs to support the load being carried. Grasspave² and Gravelpave² will meet and exceed all loading criteria.

Vehicle Loading Examples:

Auto tires: 40 psi
Truck tires: 110 psi
DC-10 tires: 250 psi
F-16 tires: 350 psi
Fire truck with outriggers: 78psi

(An 85,000 lb. truck distributed to four outrigger pads is equal to 21,250 lbs. for each outrigger pad with 12″ × 18″ surface contact with Grasspave².)

All these vehicles are well within our 5,700 psi loading capability. With a sturdy base course design, our rings will easily perform under all conditions. It's also a good design practice to strengthen concrete sidewalks and curbing that will be mounted by fire trucks.

The University of South Alabama, Mobile used Gravelpave² in parking aisles and Grasspave² in the spaces.

CSI 32 12 43 Flexible Porous Pavers

In 1997 The Construction Specifiers Institute (CSI) came out with a generalized listing (02795) for all porous paving products. However, since performance and application is varied even in the porous paving industry, the 2004 CSI MasterFormat™ has adopted a new number *32 12 43 Flexible Porous Paving*, to recognize that Grasspave² and Gravelpave² are in a class by themselves.

Best Management Practice

Porous paving is recognized as a Best Management Practice (BMP) by the Environmental Protection Agency, the Center for Watershed Protection, the U.S. Army Corp of Engineers, and countless other federal, state, regional and local authorities. In addition, Grasspave² and Gravelpave² are often mentioned by name, as the product of choice for many of these agencies.

Applications

Stormwater Management

The Grasspave² and Gravelpave² systems can easily handle storm water from an intense storm dropping three inches of rain in less than thirty minutes! In one square meter (40″ × 40″) there are 144 rings, two inches in diameter by one inch high. With one inch of fill in the rings and a standard road base of sandy gravel six

Bowditch Point Regional Park , Fort Myers Beach, Florida—Gravelpave² parking bays blend in with the natural surroundings.

The Lincoln Hills Club, Lincoln, California—This amphitheater's grass is reinforced with Grasspave² to prevent compaction, and provide a stable, attractive surface for visitors.

inches thick, our porous systems will percolate approximately ½ inch of rain per hour! A seven-inch section can store 2.4 inches of water (about 20 percent void after compaction). Alternatively, hard surfaces, such as asphalt and concrete, shed 95 percent of storm water.

Aesthetics

As a designer, engineer, contractor, or homeowner, you can be sure Grasspave² and Gravelpave² can deliver a more beautiful surface and add a unique look to a site. Grass simply looks better than asphalt and decorative gravel has been used for centuries in landscaping. Space constraints can be dealt with by combining the beauty of grass or gravel with the utility of paving.

Trees and other vegetation not only survive, they thrive with Grasspave² and Gravelpave². Porous paving has the ability to deliver water, oxygen and carbon dioxide through the cross section—all essential to root survival. Concrete and asphalt suffocate and starve the root zones of water and air. With Grasspave² and Gravelpave², you can now design in as many trees and plants as your site will allow. Grasspave² and Gravelpave² prevent compaction while allowing for ample amounts of water and air. Cars can then drive and park below tree canopies. Saving existing, mature trees is also possible with our products—our structures can come within inches of the mature tree trunk without damage. Our mats have the ability to flex with the tree root growth that would otherwise damage and crack hard surfaces.

Environmental Benefits

Grasspave² and Gravelpave² not only protect the environment, they enhance it. All of our products are made from 100 percent recycled plastic—plastic that goes into improving the environment and not into a landfill. Through bioremediation, porous pavers have the ability to clean pollutants (heavy metals, 96–99 percent; suspended solids, 95 percent; phosphorous, 65 percent; nitrogen, 82 percent, hydrocarbons, up to 100 percent) out of stormwater. Our products also reduce erosion and soil migration, reduce site disturbance, and contribute to airborne dust capture and retention.

Cooling the atmosphere and reducing the "urban heat island effect" (cities being up to 10 degrees hotter than undeveloped land) are added benefits of Grasspave² and Gravelpave². Both products can mitigate these increased temperatures. In addition, Grasspave² promotes the conversion of carbon dioxide (greenhouse gas) into oxygen and has an "air-conditioning effect."

Driveways

Environmental, economic, and aesthetic enhancements are drawing homeowners and designers to use Grasspave² and Gravelpave² in driveways. Most residential driveways are good candidates for our porous duo because of the reduced speed and limited frequency of traffic. Our products can add beauty to residential and commercial driveways.

Parking Lots

Parking for churches and synagogues, stadiums, arenas, and overflow at shopping centers, campuses, parks and more are ideal for Grasspave² and Gravelpave². These sites generally support large numbers of vehicles but only on periodic basis. Stormwater management and green space can be combined with parking, reducing maintenance, real estate, and development costs. A great design idea is combining durable Gravelpave² drive aisles with attractive Grasspave² parking bays.

Pedestrian, Horse Trails and Bicycle Paths

Garden paths, greenhouse aisles, sidewalks, park paths, and wilderness trails paved with Grasspave²/Gravelpave² provide a stable surface for strollers, bicycles, wheelchairs, and horses. There are no puddles or mud and traction is very good. Tree roots break up hard surface sidewalks, but our mats flex to accommodate such shifts and gradient changes. Plus, with the high proportion of air, roots are discouraged from moving upward. Mountain bikers will not be able to tear up paths reinforced with Grasspave²/Gravelpave². Our products can resist the destructive forces of mountain bikes, allowing your trails to be reopened to bikes.

Fire Lanes

By far, the most common application for Grasspave² and Gravelpave² installations is for fire lanes. Our long and established history of providing safe, well-constructed fire lanes began in 1982 with our first installation in Snowmass, Colorado, near Aspen Ski Resort. Since then, we have firmly established credibility for this application. Tests have been conducted by several fire departments in Aurora, Colorado and Irvine, California. Nearly every major U.S. metropolitan area has accepted and used Grasspave² in a fire lane. You will most likely find a fire lane installation in your area.

All fire fighting vehicles can safely navigate even a wet Grasspave² or Gravelpave² surface. In a 1983 test this 100-foot ladder truck was lifted off the Grasspave² by rear outriggers, and no ruts were caused by either outriggers or tires. The ladder was extended, rotated, and loaded with no depressions in the road surface.

Apartment complex, Concordville, Pennsylvania—Several overflow Gravelpave^2 parking lots encompass the majority of the perimeter area on the west and south sides of the property. Grasspave^2 (not shown) is installed on site in two grass fire lanes.

Grasspave^2 Installation—Mats can be rolled out in minutes!

600 m^2 (6,000 sf) per two-person hour! For steps shown below—100 m^2 (1,080 sf) per two-person hour!

Place and compact sand and gravel base course.

Apply Hydrogrow mixture.

Roll out Grasspave^2.

Fill rings with clean sharp concrete sand.

Hydroseed or lay sod.

Roll sod with heavy roller.

Ready for use after two mowing cycles.

Use a regular lawn mower for maintenance.
Do not aerate!

The Grasspave^2 porous pavement system is comprised of a sandy gravel base course, Hydrogrow polymer-fertilizer mixture, the Grasspave^2 ring and grid structure, sharp concrete sand, and grass seed or sod.

Grasspave^2 Installation Procedures

This installation section is only intended as an overview. Please review our Grasspave^2 Technical Specifications (available at www.invisiblestructures.com or call 800-233-1510) for comprehensive installation instructions.

Excavate a space for the base course as determined by site soils and loading requirements. Place and compact sandy gravel which should be a mixture of clean sharp sand and gravel varying in size but not exceeding 3⁄4 of an inch. To check porosity, use a hose to see that water flows into the base and drains away. Add subsurface drainage as necessary to low spots or locations with poor draining soils. Install irrigation lines and sprinkler heads if necessary.

Apply the Hydrogrow mixture that is included free with your order. Hydrogrow is a mixture of polymer and fertilizer designed especially for our Grasspave^2 system.

Roll out Grasspave^2, aligning the side hole fasteners over the side pegs. The warmth of the sun will relax the plastic so it lays flat. Cut the grid between rings using pruning shears. Incorporate the cut pieces in other areas, as needed, keeping the distance between the rings uniform.

Fill rings with clean sharp concrete sand (AASHTO M6 or ASTM C-33) using large rakes and brooms so that the tops of the rings show when done.

Lay turf over the rings. On warm days, wet the sand first to lower sand temperature and provide moisture for grass roots. Seeding and hydromulching is also an accepted vegetating method at this stage. Repeated hydromulching/seeding may be necessary.

Roll sod with heavy roller to eliminate air pockets and make sure roots are in contact with the sand fill. Water lawn as usual according to climatic requirements.

Whether the area has been seeded or sodded, wait to drive on grass until two mowings have been completed, by which time the root system will be established and the sod pieces locked into place. In an emergency such as the need for fire truck access, grass may be driven on immediately after installation.

Use a regular lawn mower for maintenance. There should be no paver parts protruding through the surface that would damage mowers. Do not aerate!

Place and compact sand and gravel road base.

Roll out Gravelpave², aligning the snap fit fasteners.

Secure mats with anchors provided (size and type may vary).

Fill rings with clean gravel.

Compact gravel with vibrator roller or flat plate compactor (not shown).

Gravelpave² Installation—

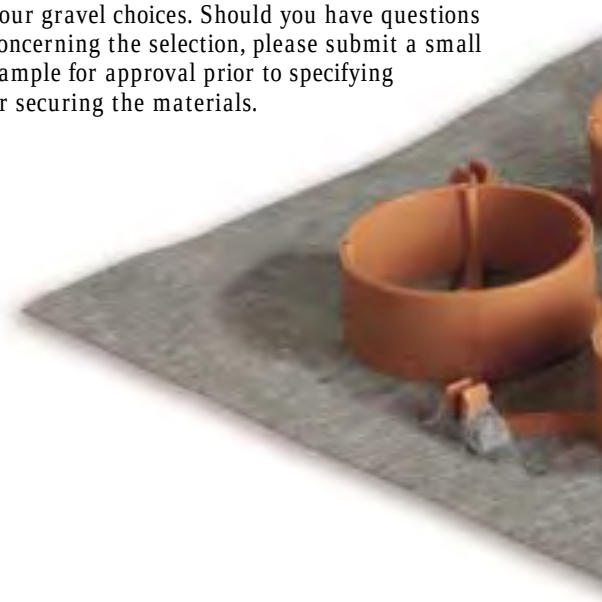
Gravelpave² Size/Shape Fill Requirements

You will need 1″ of gravel fill, compacted. Be careful to order enough for the compaction process and choose a gravel size that will nest well into the rings. We have found that 3/16″ minus crushed stone and sometime 3/8″ with limited small sharp screenings (#40 to #100 screen) works well. Washed gravel will roll within the rings and will also "roll about." For this reason, we do not recommend pea gravel, even though it is often very attractive. A visit to your local quarry is suggested. We have found that some geological areas of the United States have limited types of sharp gravel available. It has been necessary to import gravel from a neighboring state, but remember the amounts are relatively small—the top one-and-a-quarter inch of the cross section. Gravel should be as free of fines as possible. To maintain porosity, avoid soft stone materials with low durability that will break easily.

Other Fill Materials for Gravelpave²

Please ask our staff for assistance with this category since it is use-specific and often experimental. Ground rubber, crushed glass, crushed brick, and many other materials can be useful as attractive fill materials for various applications. Thermoset (epoxy, polyurethane, etc.) binders may be cost prohibitive for most projects, but offer unique design possibilities, including clarity, color enhancement (wet look), flexibility, and durability.

Our technical support staff will assist with selection of gravel sources. The photographic samples shown on this page will help you narrow your gravel choices. Should you have questions concerning the selection, please submit a small sample for approval prior to specifying or securing the materials.



Mats can be rolled out in minutes!

Gravelpave^2 Installation Procedure

This installation section is only intended as an overview. Please review our Gravelpave^2 Technical Specifications (available at www.invisiblestructures.com or call 800-233-1510) for comprehensive installation instructions.

Prepare sandy gravel base course to a depth as determined by a soils engineer. Compact with a vibrating plate compactor or use a heavy motorized roller for large jobs. To test porosity, water with a hose and check to see that water drains readily through the base course before installing the Gravelpave^2 mats.

Roll out mats with the grain (in the same direction) so that the snap fit fasteners can be used with neighboring mats. To fit around boxes and curbs, cut the grid between the rings with pruning shears and scissors or a small portable electric hand saw.

Fasten the mats together using the snap fit fasteners that are molded into the product inserting the prongs into the rectangular openings. Tuck the fabric underneath the fasteners to keep joints closed. A quarter-inch nut driver head (6 mm) fits nicely over the fastener to compress the pieces together. A piece of lumber placed under the Gravelpave^2 mat will provide stability to aid in fastening.

Supplied anchors must be used to secure the mats to the base. Hammer anchors with washers at a rate of one anchor per six rings in both directions. Use extra anchors around the perimeter of the Gravelpave^2 install and in high traffic areas. Reciprocating hammers can be used to speed up the anchoring process. Anchors should be placed inside the rings as close to the center as possible. Begin anchoring from one corner in a radial pattern.

Gradually place gravel fill (see suggested fill material on facing page) into rings by using a front-end loader and shaking out the fill as the machine drives forward. Carefully lower the bucket when empty and back up while dragging it *above* the rings to smooth out the gravel, finishing with a stiff broom. Wheel barrow and shovel works well for small jobs. Contractor tip—you can store excess material for future maintenance, top dressing as may be necessary. Use rakes and/or push brooms to distribute the gravel fill to a level slightly above rings so that compacting the fill will not uncover the rings.

Use a vibrating plate compactor or large driving roller again to compact the gravel fill. Additional gravel may be necessary to finish filling the rings. Compact again until the material appears solid in the rings. Wetting the gravel may help it to interlock.

Drive on the installation when finished. If car tires make a pattern, there may be too much gravel or it may need additional compaction. It is expected that tops of the rings may be visible. If sides of the rings show, then add more fill material and repeat the compaction process.

Golf Industry

Gravelpave^2 and Grasspave^2 golf cart paths give the look of a natural path through trees, along fairways, and around greens. The flush surface requires no trimming or edging. Traction is excellent with Gravelpave^2 and Grasspave^2 traction is slightly better than grass. Grasspave^2 and Gravelpave^2 can enhance your golf cart staging area, pedestrian traffic area, parking lot, road shoulder, and maintenance yard.

Automobile Dealership Displays

Car dealerships have discovered that Grasspave^2 and Gravelpave^2 are perfect for automobile display areas. Dealerships now have an option when it comes to adding paved areas for car transport and display. Dealerships like the "soft" attractive look grass and decorative gravel provide.

Utility and Maintenance Vehicle Access

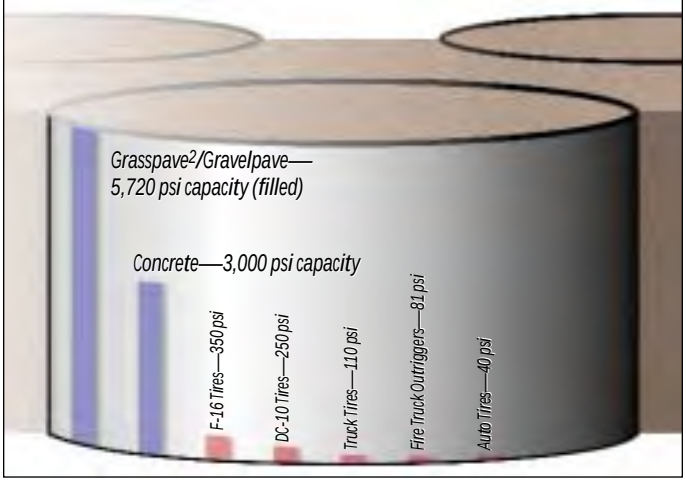
Providing your site with important utilitarian functions without compromising beauty is simple. Grasspave^2 and Gravelpave^2 can incorporate a structural road without interrupting your landscaping. No obtrusive concrete or asphalt access roads are necessary to get to window washing areas, pump stations, microwave towers, tanks, or electrical boxes.

Unique Applications

Our mats are installed in some unique and interesting places: Helicopter landing pads, race car display areas, outdoor amphitheater seating, under picnic tables, under concrete pavers (support), airplane display and transport, cemetery marker reinforcement, eave drip lines and more. Installations are not limited to traditional paved areas.

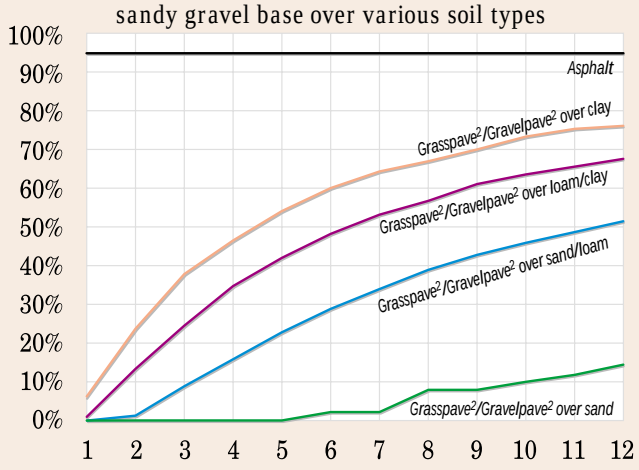
Lab Compression Test Results

Load-bearing capacity of filled Grasspave^2/Gravelpave^2 rings vs. concrete, and vehicle loading examples



Runoff Comparison Chart

Runoff coefficients, Grasspave^2/Gravelpave^2 and sandy gravel base over various soil types



Calculations include GP^2/GV^2 placed over 6" of sandy gravel base course, laid over native soils indicated.

Large Rolls

Our patented systems have a shipping, handling and installation advantage as well—large rolls. Our standard roll size (model 2020) covers 431 sq. ft. (40 m^2) and weighs 192 pounds (87 kg). Other roll sizes are available. Installers of our products have repeatedly commented that they enjoy the easy installation. Rolling out Grasspave^2 is similar to rolling out carpeting and coverage is fast and efficient. The mat system can be easily cut to fit around trees, irrigation, curbing, or other terrain. The rolls have snap-fit connectors to attach to adjacent rolls, making one unified, contiguous system. This unified mat system adds stability and continuity in design. Grasspave^2 can just as easily be snapped to Gravelpave^2 to add stability and product variation.

Hydrogrow

Another reason Grasspave^2 is the industry leader is the addition of Hydrogrow soil amendment, which is supplied with your order. Hydrogrow is engineered to help grass grow in our sand based root zone. The results are amazing and our Grasspave^2 areas often look healthier than surrounding turf. By using this special mixture in the sand, porosity will be maintained, turf will be attractive, and aeration will not be necessary.

Sand Fill

Grasspave^2 is the only grass paver on the market specifying sand as part of its cross section. Sand is the best medium to provide water and air to the roots and still provide high compressive strength. The United States Golf Association uses sand for every USGA golf course and nearly every professional and collegiate turf athletic field uses a sand cross section as well. Topsoil (or other organics fill material) in the rings will eventually compact and damage the root zone. Sand negates the need for mechanical aeration, which can damage Grasspave^2 and other grass pavers.

Grasspave^2 Characteristics

Ring and Grid Structure

Grasspave^2 is by most accounts the best flexible grass paver made today. Its unique ring and grid structure allow for flexibility, stability, and exceptional grass growth. With 92 percent void space for healthy roots and 100 percent grass coverage, Grasspave^2 is the industry's preeminent choice. Our installations are hard to find because they are invisible! With so little plastic near the crown of the grass, the blades of grass are not smashed by product. Root development is not interrupted from spreading laterally. The rings are strong and rigid, keeping grass root systems protected from harm. The roots grow directly downward, deep into the sandy gravel base course.

Strength When Installed

When installed over a thick base course and compacted to 95 percent modified Proctor, sand-filled rings can support 5,700 pounds per square inch (psi) without deflection or compromise to safety. The cylinder is the strongest shape to support compressive loads because it has no corners. Supporting heavy loads with the rings allows us to use less plastic in the product creating a 92 percent void area for root development, combined with strength! Less plastic means a lower cost for you.

Fort Shantok State Park, The Mohegan Tribe, Uncasville, CT—Low-maintenance parking lot stable for cars, strollers, and wheelchairs. This lot is plowed in the winter.

Traffic Frequency

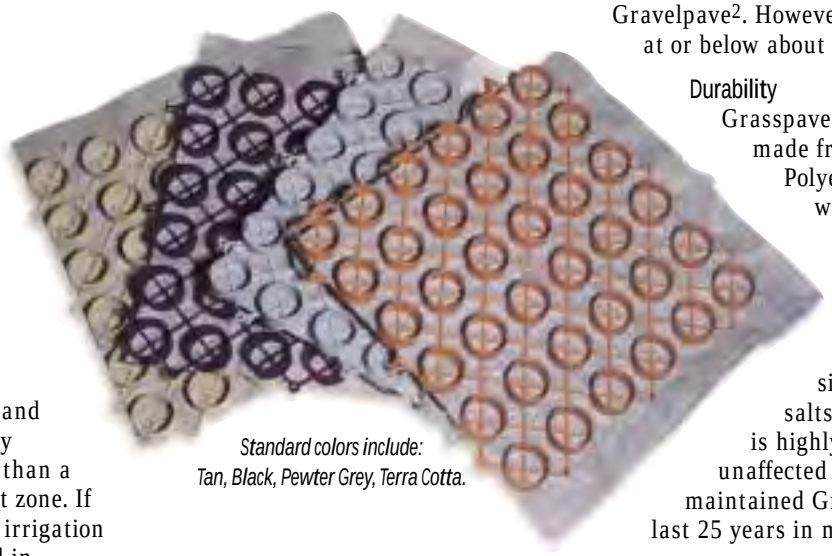
Grass as a surface material can withstand from two to six (varies with grass species and environmental conditions) trips daily over the same spot. This suggests that most parking applications we pave with asphalt today could be paved with Grasspave^2 instead. Vehicles can remain parked on grass for extended periods of time, provided some relief can be given for a few days for the grass to recover.

Lifespan

Grasspave^2 has a projected lifespan of 60 years. Compared to asphalt with a lifespan of 15 years; and concrete with a lifespan of 25 years, Grasspave^2 will save you money on replacement costs.

Irrigation

Grass needs water and you may need to have irrigation installed. Grasspave^2 has a sand based root zone which usually requires slightly more water than a normal topsoil or organic root zone. If golf courses in your area use irrigation systems, you probably should in your Grassapave^2 installation.



Standard colors include: Tan, Black, Pewter Grey, Terra Cotta.

Gravelpave^2 Characteristics

Fabric, Ring and Grid

When we developed Gravelpave^2 in 1993, our goal was to provide designers a second option for a porous pavement that can tolerate high frequency and low-speed traffic. By molding our ring and grid structure onto a non-woven polyester filter fabric, we were able to create a new product that contains gravel and prevents particle migration and rutting.

Gravelpave^2 is the only system specifically designed for aggregate containment porous paving. The cylinders displace the load onto an engineered base course and hold the decorative gravel in place. The fabric keeps the top-dress gravel from compacting into the road base, acts as a weed and vegetation barrier, and suppresses dust.

Traditional pavements, including gravel roads, are designed to shed water and keep it away from the pavement's cross-section. Gravelpave^2 is designed to do the opposite—welcoming water down through the system. Plus, Gravelpave^2 will not rut, washboard, or puddle like traditional gravel roads.

Snap-Fit Fasteners

Designed into Gravelpave^2 is a snap-fit fastener, a two-pronged arrow that fits into a rectangular slot. Simply push the slot over the prongs to easily snap together panels of Grasspave^2. To take them apart, just squeeze the prongs together and lift off the slot.

Should the fasteners of one mat not align over the distance of another mat, then anchor pins (or eight inch ring shank nails and large washers) can be used to secure the mats along the seam. Forcing the alignment can cause the mats to ripple and not lay down evenly.

Traffic Frequency

Gravelpave^2 has no limits on frequency or duration of traffic on the system. Park or drive as often as you like on Gravelpave^2. However, speeds should be kept at or below about 20 mph (30 km/h).

Durability

Grasspave^2 and Gravelpave^2 are made from flexible High Density Polyethylene (HDPE) plastic with UV inhibitors, which withstands repeated freeze-thaw cycles and continuous subzero temperatures without cracking. HDPE resists aggressive chemicals such as road salts, motor oils and fuels. HDPE is highly abrasion-resistant and is unaffected by extremes in pH. A well-maintained Gravelpave^2 installation will last 25 years in most climates.

Aesthetics

Part of what draws many designers to use Gravelpave^2 is the ability to have an area maintain a natural look. Many times native soils or gravel can be used as fill material, complementing surrounding areas. Gravelpave^2 is available in four standard colors—black, tan, gray, and terra cotta (custom colors are available at additional cost). Ring colors are intended to blend with the gravel color so they will be less visible should some portion of the rings show. A small amount of excess stone fill should be left above the top of the rings to provide visual cover and additional UV protection. This excess will migrate, but usually not very far.

Size and Shape Requirements for Gravel Fill

You will need one and a quarter inch (3.2 cm) of gravel fill, before compaction. After compaction the gravel should be only be slightly higher than the rings (⅛ inch, 3 mm above). The following criteria for gravel fill will make the most of the systems performance:

- Hard—resistant to breaking, crushing or crumbling
- Sharp and angular (do not use rounded pea gravel)
- Clean, washed (free of fines)
- Size 3⁄16 to 3⁄8 inch (5 mm to 1 cm)

Other fill material may be used in certain situations, but may be considered use-specific or experimental. Please consult with our technical support staff regarding fill material not meeting the above criteria or for installations requiring "binders."

Invisible Structures—Standard Product Roll Sizes

	Width		Length		Diameter		Area		Weight	
Model	m	ft	m	ft	m	ft	m^2	ft^2	kg	lbs
1010	1	3.3	10	32.8	0.5	1.7	10	108	22	48
1020	1	3.3	20	65.6	0.8	2.7	20	215	44	96
1520	1.5	4.9	20	65.6	0.8	2.7	30	323	65	144
2020	2	6.6	20	65.6	0.8	2.7	40	430	87	192
2520	2.5	8.2	20	65.6	0.8	2.7	50	538	109	240

Rolls can be installed manually (2 people advised). Rolls apply to Grasspave^2, Gravelpave^2, Draincore^2, and Slopetame^2.

Denver Tech Center Corporate Client, CO—Curving Grasspave² firelanes around both buildings lends opportunity for private outdoor lounge area for employees who can also enjoy the garden view from their office windows.

Dust Suppression

Dirt and gravel roads have the potential to kick up dust and dirt when traversed. Many communities have regulations limiting or eliminating gravel surfaces from new construction. Rest assured, if you design a Gravelpave^2 surface you will be getting a virtually dust-free surface. The clean and washed fill material required to fill the rings will not have any more dust than an asphalt-paved surface. Gravelpave^2's geotextile fabric will prevent the dust-sized particles contained within the base material (existing gravel surface or dirt), from being displaced by moving tire or wind forces.

Oakdale Nature Preserve, Freeport, Illinois—Gravelpave^2 reduces erosion and rutting in this ADA accessible trail.

Industry Advantages

Economic Advantages

Whether you are an engineer, architect, landscape architect, contractor or homeowner you will be concerned with the cost of you project. Grasspave^2 and Gravepave^2 will save you money. Our products will save on design costs, installation costs, component materials, maintenance/operations expenses and lifecycle costs. We can find a way to reduce your site expenses with our porous pavers.

When designing, you may be able to eliminate or reduce stormwater filters, detention basins, conveyance lines, modifying grading requirements, or many other "necessities" associated with asphalt or concrete. A great deal of your stormwater mitigation plan can be built into Grasspave^2 and Gravelpave^2.

Installers have been astounded by the speed and efficiency for which large areas can be accommodated by our large rolls. Unrolling our mats, snap fitting, and cutting is easy and requires no special machinery. Please view our technical specifications (from www.invisiblestructures.com, call 800-233-1510, or available through our partner network) for the installation procedure. A brief installation overview is also on pages 8 and 10).

In addition to cost savings in the design phase, you may be able to eliminate other components during installation such as root protection for trees, grates, manholes, curbing, and tree and vegetation removal costs.

Maintenance and operations costs are significantly reduced over asphalt and concrete surfaces. A. (Andy) E. Lindsey, Director of Grounds Maintenance, University of South Alabama, in his written analysis dated February 18, 1999, compared the cost of our porous systems to asphalt pavement using historical data from university records. The conclusion was a $56,000 savings over 20 years, by using Grasspave^2 and Gravelpave^2.

Our products can save you the most money by combining your surfaces' uses into one area. Multiple surface use means savings on real estate, design costs, maintenance, insurance and more. You can have a fire lane that doubles as "green space" for employees or visitors, combine a parking lot with a bio-swale and stormwater mitigation system, and expand your lawn into the driveway. The Grasspave^2 and Gravelpave^2 installations at Reliant Stadium, Houston, Texas, pull quadruple duty, providing over seven acres of parking, stormwater mitigation, required "green space," and an outdoor festival site which generate additional income.

As mentioned above, Grasspave^2 and Gravelpave^2 have a longer lifespan than asphalt. Compound the above savings with the longer lifespan, and you can have a lifecycle cost which can save thousand of dollars on even moderately sized installations.

Competitive Advantages

Our porous pavers not only have advantages over impervious surfaces, we are proud to compete with any other plastic porous pavers manufactured. Our products are the strongest on the market 5,721 psi installed (39,273 kPa, 823,844 psf or 7,414,416 psy), or 2,100 psi empty. Grasspave^2 and Gravelpave^2 have

Compacted sandy gravel road base placed above compacted subgrade, 95% modified Proctor density. Gravelpave^2 rolls are laid, pinned, and filled with clean, sharp gravel.

For Grasspave^2: Compacted sandy gravel road base placed above compacted subgrade, 95% modified.

Reliant Stadium at Reliant Park, Houston, TX—The largest engineered grass porous system 30,800 m² (317,000 sq ft) provides parking, stormwater management, and a cool surface for festivals and concerts.

92 percent void space for the best root development and grass coverage (Grasspave²) and the most volume available for desired fill (Gravelpave²). Most other plastic pavers come in rigid unit blocks, which are cumbersome to install and difficult to cut and shape. Grasspave² and Gravelpave² rolls are considered the favorite to work with by installers, for the flexibility, continuity, and speed of installations. Grasspave² is the only product on the market specifying sand infill for the grass roots. Sand is recommended as the infill of choice for grass pavers by Professor Bruce K. Ferguson, Univ. of Georgia, author of the book, "Porous Pavements."

Competing Technologies

Porous paving technology has made great strides not only in flexible plastic pavers but in other areas as well. Permeable asphalt, permeable concrete, interlocking unit blocks, reinforcement mats, and concrete grid pavements, have all improved and advanced to meet the growing demand for environmentally friendly technologies. It is Invisible Structures' firm belief that you should use porous paving, even if it is not our product line, whenever possible. The more you use these technologies, the better accepted they become: If you have to pave, porous pave!

Invisible Structures also contends that while these competing technologies have their place, in most instances, our Grasspave² and Gravelpave² systems outperform, last longer, require less maintenance, look better, and are easier to install. Check with our technical specialists at 800-233-1510 for the latest data.

Vancouver City Works Yard, Vancouver, British Columbia—main staff parking lot, done in Gravelpave².

Fire lane, San Mateo, CA—Many native grasses and other attractive vegetation can be grown in Grasspave².

Designing for Grasspave² and Gravelpave²

Design for Use

There is an area in your development, site, or home that will most likely benefit from Grasspave² and Gravelpave². We advise that you take a look at proper use patterns, site conditions, and other specifications to get full advantage and long life out of our products. *Invisible Structures, 800-233-1510, is available for preliminary design assistance and consultation. Please note that other porous paving systems are NOT interchangeable with Grasspave² or Gravelpave², consult our technical specifications for full installation instructions.*

Considerations for Design:

- High use, low speed, and unlimited traffic volume is optimal for Gravelpave²
- Low to moderate use, low speed, with recovery time is perfect for Grasspave² or Gravelpave²
- Keep the porous paving area free of sediment and erosion from adjacent areas as they can cause drainage and aesthetic issues. Extra care should be taking for use in swales or berms.
- Slope should be considered. Grasspave² and Gravelpave² perform the best for all vehicles when the slope is no greater than 8 percent. Light vehicles (golf carts), bicycles, and pedestrian areas can have up to a 20 percent slope. Grasspave² in fire lanes should not exceed five percent (consult your local fire departments).
- Check the permeability of existing underlying soils. Percolation rates should be .64 cm to 1.3 cm of water per hour (EPA guidelines).
- The water table should be about three feet (approx. 1 m) below base course in most instances.
- Bedrock should not be closer than two feet (0.6 m) below base course.
- Avoid use of Grasspave² and Gravelpave² in areas where high-speed acceleration or braking and turning occur. Examples are entrances and exits to parking lots that connect to higher speed roads.

If your site varies from these conditions, please consult ISI directly, 800-233-1510, as some conditions can be overcome with design and component adjustments.

Base Course Design

Calculating the depth and composition of materials for the base course incorporates the same design criteria as for other pavements:

- Load-bearing capacity of native (or fill) subsoil,
- Plasticity or impact of moisture on strength and longevity,
- Frostheave potential, and
- Traffic load, frequency and/or duration.

Sample Base Course Depths

Please consult with a soils engineer for site-specific base requirements. Generally, the depth that is used under asphalt will be the requirement under Grasspave²/Gravelpave². Golf carts and pedestrian traffic may require nothing over sandy gravel soils, and just two to four inches of base course (5–10 cm) over very weak soils. Cars usually need a six- to eight-inch base course (15–20 cm). Buses, trucks, and fire engines can easily require eight to 12 inches (20–30 cm) or more. The use of geotextiles, below the base is not required, but will prevent integration with subsoils and is strongly advised in areas of clay or silt soils and frost heave. *Do not use 100 percent limestone base as limestone will compact and become impervious—If limestone must be used, mix with 25–30 percent sand (AASTO M6 or equal).*

Garden of the Gods Park, Colorado Springs, CO—Horse and pedestrian trail stabilization to prevent ruts previously as deep as three feet. Horse traffic contributes to loose soil erosion without Gravelpave2. Terra Cotta rings were used to match existing sandstone soils.

Bedding Sand Not Necessary

Do not use a sand setting base with our products. Unlike concrete pavers, bricks, and other rigid pavers—our Grasspave² and Gravelpave² are flexible and do not require sand to level.

Edge Protection

For aesthetic and maintenance considerations, you may want to design in a durable edging material to separate our porous pavers from adjacent areas of turf or to simply delineate a fire lane or path. With Gravelpave², an edging can prevent vegetation from encroaching onto the system and can prevent the gravel fill from migrating at the edge. Steel, aluminum, wood, brick, or concrete are all acceptable edging materials. Keep the edging flush or slightly higher than the porous paver grade.

Maintenance and Operation

Grasspave² Maintenance

Irrigation is required in dry climates. Any popular pop-up system can be used. Simply cut out rings to reveal the irrigation head. If golf courses in your area use irrigation systems, you probably should in your Grasspave² installation. Be careful not to overwater as this will encourage shallow root development.

Fertilize once a year with an NPK slow-release fertilizer that contains trace elements. There are many brands on the market. Do not aerate! You'll end up with product damage. When installed using sand in the rings, there will not be a compaction problem. Be careful not to use clay-based sods in pedestrian or vehicular traffic areas—use sandy soil sod, or seed and mulch. There seems to be no problem with sod selection for fire lanes. If the Grasspave² area has just been seeded or sodded, drive on it only in an emergency.

Gravelpave² Maintenance

Potholes will only appear if the base course has not been compacted properly before laying the rings or if the base material is allowed to mix into clay soils below (use nonwoven fabric to keep separate). Should this occur, remove a section by vacuuming the gravel from the rings, unfasten the snap fit fastener, bring the base course to the proper grade and compaction, put the Gravelpave² square back in place, anchor, and fill to the top of the rings. Seasonally check the rings in high-traffic areas and entrance lanes for lower levels of fill and replace by sweeping gravel from other areas to bring it level again. Leaves should be raked or vacuumed and not allowed to decay. Organic matter will stimulate weed growth and reduce porosity. To attack any occasional weeds that may locate within the Gravelpave² installation, simply spray them with a weed killer (such as Roundup™) and remove them when dead.

Cold Climate Concerns

Porous pavement thaws faster than conventional pavements because it allows melted water to flow directly through the pavement, increasing the temperature in the cross-section.

Grasspave² and Gravelpave² are made from flexible High Density Polyethylene (HDPE) plastic with UV inhibitors, which withstands repeated freeze-thaw cycles and continuous subzero temperatures without cracking.

Private Residence, Houston, TX—Grasspave² supported grass sections in this custom home driveway.

Grand Canyon Trust, Flagstaff, AZ—Thirty-car employee parking lot after several years of snow removal and excellent maintenance. Spaces are defined with concrete bumpers.

Fire departments usually require you to plow snow that is over three inches deep. (7.5 cm). Consult with your local fire department for their guidelines.

Educate your snow removal crew to take care not to have the plow blade make contact with the Grasspave^2 or Gravelpave^2 systems. Experienced snowplow drivers can leave a thin layer of snow on the systems or they can attach skids (¾ inch—2 cm) to the bottom of the blades.

Sales and Technical Support Partners

Invisible Structures, Inc. welcomes the opportunity to review designs and answer technical questions. Design details, technical specifications, white papers, and other support material may be downloaded from our web site. See a comprehensive list of project profiles and case studies at www.invisiblestructures.com.

In addition to the high-quality, professional, experienced staff at our main headquarters in Colorado, we have excellent partners representing their geographical areas. They are prepared to assist you locally, at all levels, with your project needs. Please contact us or check our web site for your partner name and information.

Contact Information

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Fax 800-233-1522 overseas and locally 303-233-8282
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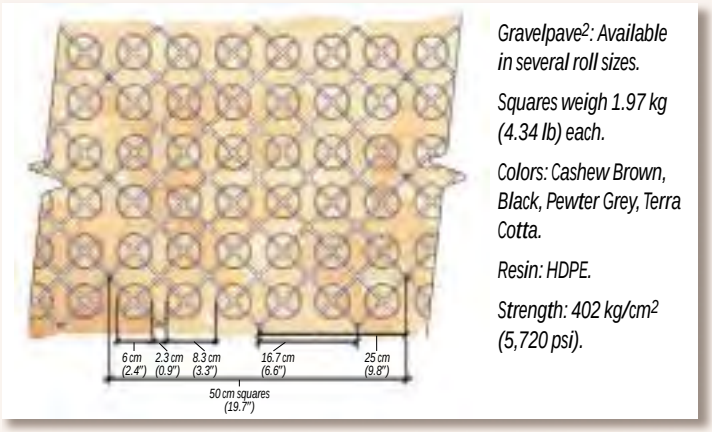
email: sales@invisiblestructures.com

Grasspave^2 is used as a cool, stable surface for picnic tables at a community pool.

City of White Rock Operations , White Rock, British Columbia—Gravelpave^2 is used in the main drive aisle of the works yard and Grasspave^2 is used for the parking bays.



Gravelpave^2: Available in several roll sizes.

Squares weigh 1.97 kg (4.34 lb) each.

Colors: Cashew Brown, Black, Pewter Grey, Terra Cotta.

Resin: HDPE.

Strength: 402 kg/cm^2 (5,720 psi).

Grasspave^2 and Gravelpave^2: Reusable snap connector requires 5 lbs to connect and resists 70 lbs of pull-apart force.

Glendale Community College, Glendale, Arizona—The Gravelpave^2 fire lane (foreground) and Grasspave^2 fire lane (background) complement the surroundings at the Glendale campus.

Beachrings²

Beachrings², a portable and re-usable plastic boardwalk system, provides an attractive, comfortable, and slip resistant surface for equal access to beaches. Beachrings² also works well for temporary vehicle access over mud and sand.

Draincore²

Draincore² conveyance layer is used for advanced subsurface and green-roof applications. A replacement for antiquated French drains, Draincore² can maximize drainage (58 gpm per foot width) and minimize costs.

Rainstore³

Rainstore³ is the new standard in efficient sub-surface stormwater storage. Rainstore³ is modular and stackable for versatile site design. Rainstore³ is 94% void space and can be designed for detention, retention, or water harvesting for re-use.

Slopetame²

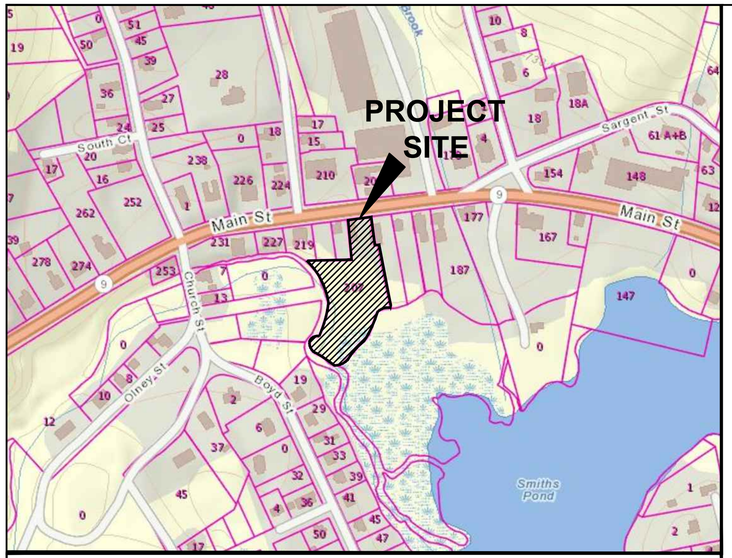
Slopetame²—much more than an erosion control blanket or mat—a completely integrated system of rings, grid, fabric, anchors, and vegetation to control erosion on some of the toughest slopes, channels, swales and more.

Quick Reference Guide for Grasspave² and Gravelpave²

	Grasspave²	Gravelpave²
Description	Connectable ring and grid system	Connectable ring, grid, and integrated fabric
Also Included	Hydrogrow polymer—exclusively for Grasspave²	Geotextile fabric molded to grid (exclusive to Gravelpave²) and anchors
Available in Large, Flexible Rolls	Yes, various sizes—see roll chart page 14	Yes, various sizes—see roll chart page 14
Colors	Black	Black, gray, tan, terra cotta, custom colors extra
Components Needed for System	Base course, sand, labor, sod or seed (irrigation is recommended)	Base course, 1¼″ (3.2cm) of 3/16″ to 3/8″ decorative gravel, and labor
Traffic	Low speed, intermittent to moderate use	Low speed, unlimited use
Compressive System Strength	Filled: 5,721 psi (39,273 kPa); Empty: 2,100 psi (14,470 kPa)	Filled: to 5,721 psi (39,273 kPa) Empty: 2,100 psi (14,470 kPa)
Life Span	60 years	25 years
Recommended Maximum Slope	5% fire lanes, 8% car/light truck, 15-20% golf carts, pedestrian use, and trails	5% fire lanes, 8% car/light truck, 15-20% golf carts, pedestrian use, and trails
Stormwater Storage	Yes	Yes
Clean Pollutants through Bioremediation	Excellent	Good
Air-Conditioning Effect	Yes	No
Heat Island Mitigation	Yes—thermal conductivity, heat storage capacity, density, albedo (.40) and emissivity	Yes–thermal conductivity, heat storage capacity, density, albedo (varies) and emissivity
Reduces Runoff and Non-Point Source Pollution	Yes	Yes
Recycled Content	100% recycled HDPE plastic	100% recycled HDPE plastic, remnant fabric
Erosion Control	Yes	Yes
Airborne Dust Capture and Retention	Excellent	Good
Promotes and Retains Tree Growth	Yes	Yes
Recharges Groundwater	Yes	Yes

Invisible Structures, Inc.

1600 Jackson St., Suite 310, Golden, CO 80401, USA
800-233-1510 · Fax: 800-233-1522
Overseas and locally: 303-233-8383 · Fax: 303-233-8282
www.invisiblestructures.com
email: sales@invisiblestructures.com



LOCUS PLAN

SCALE: 1"=200'

GENERAL NOTES:

1. THIS PLAN WAS PREPARED BY H. S. & T. GROUP, INC. (HS&T) OF WORCESTER, MASSACHUSETTS. AN ON THE GROUND BOUNDARY AND TOPOGRAPHIC SURVEYS WERE PERFORMED FOR THIS PARCEL BY H. S. & T. GROUP, INC. ON OCTOBER 13, 2016.
2. ADDITIONAL SUPPLEMENTAL INFORMATION WAS TAKEN FROM THE FOLLOWING PLANS:
   - A PLAN ENTITLED "LEICESTER–1947 ALTERATION" PREPARED BY MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS. THE PLAN CAN BE REQUESTED FROM MASS DOT.
   - A PLAN ENTITLED "LAND OWNED BY CHARLES A. CARRON AND MILDRED E. CARRON LEICESTER, MASS" PREPARED BY FRANK H. ANDREWS., PLS DATED OCTOBER 4 1976. THIS PLAN IS RECORDED AT WORCESTER REGISTRY OF DEEDS PLAN BOOK 430 PAGE 53 ON OCTOBER 13 1976.
3. THE DEED FOR THIS PARCEL CAN BE FOUND IN DEED BOOK 52695, PAGE 348 IN THE WORCESTER DISTRICT REGISTRY OF DEEDS.
4. THIS PROPERTY IS SHOWN AS MAP 23C LOT E26 ON THE TOWN OF LEICESTER ASSESSOR'S MAPS.
5. THIS PROPERTY IS PART OF THE BUSINESS (B) ZONING DISTRICT IN THE TOWN OF LEICESTER, MASSACHUSETTS.
6. THERE ARE BOARDING VEGETATED WETLANDS AND RIVER FRONT & BOARDING VEGETATED WETLAND BUFFER ZONES ONSITE.
7. THE SITE IS NOT LOCATED IN A FLOOD HAZARD AREA AS INDICATED ON FEMA FLOOD INSURANCE RATE MAP NUMBER 25027C0801E.
8. ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION. CONTRACTOR MUST VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES AFFECTED BY THE WORK PRIOR TO CONSTRUCTION. CONTRACTOR SHALL ASSUME ALL LIABILITY ASSOCIATED WITH THE VERIFICATION, DISTURBANCE AND/OR REPLACEMENT OF ALL EXISTING UTILITIES ENCOUNTERED PRIOR TO OR DURING CONSTRUCTION. CONTRACTOR SHALL CALL "DIG–SAFE" (811) 72 HOURS PRIOR TO CONSTRUCTION (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS) TO HAVE THE UTILITY LOCATIONS MARKED.
9. ALL REQUIRED PERMITS SHALL BE SECURED PRIOR TO COMMENCING WORK.
10. ANY WORK IN AN EXISTING TOWN ROAD WILL REQUIRE A ROAD OPENING PERMIT FROM THE MILLBURY DEPARTMENT OF PUBLIC WORKS.
11. THE CONTRACTOR SHALL CONTROL AIRBORNE DUST WITH USE OF SPRAYED WATER AS REQUIRED TO MINIMIZE IMPACT ON NEIGHBORING PROPERTIES.
12. ALL WORK SHALL CONFORM TO THE TOWN OF LEICESTER ZONING BYLAWS, ZONING BOARD OF APPEALS DECISIONS, CONSERVATION COMMISSION ORDER OF CONDITIONS, DEPARTMENT OF PUBLIC WORKS AND ANY OTHER LOCAL BYLAWS OR STATE REGULATIONS (IF APPLICABLE).
13. THE CONTRACTOR SHALL STRIP TOPSOIL AND STOCKPILE ONSITE FOR REUSE. SOIL STOCKPILES SHALL BE NO HIGHER THAN 8 FEET. STOCKPILES SHALL BE ENCLOSED BY TEMPORARY SILT FENCES AND HAYBALES TO PREVENT THE TRAVEL OF SEDIMENT.
14. THE CONTRACTOR SHALL MAINTAIN COMPLETE RECORDS OF AS–BUILT LOCATIONS OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES. THE CONTRACTOR SHALL PROVIDE THE TOWN AND HS&T WITH COMPLETE AS–BUILT PLANS UPON COMPLETION OF THE PROJECT.
15. THE AREA OR AREAS OF ENTRANCE AND EXIT TO AND FROM THE SITE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE PUBLIC RIGHT–OF–WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE PUBLIC RIGHT–OF–WAY MUST BE REMOVED IMMEDIATELY.

LOT ZONING SUMMARY

TOTAL LOT AREA: 25,287 SF (0.58 ACRES)
ZONING DISTRICT: BUSINESS DISTRICT
EXISTING USE: SINGLE–FAMILY BUNGALOW STYLE DWELLING
PROPOSED USE: MIXED–USE DEVELOPMENT, VERTICAL MIX, 1–3 UNITS

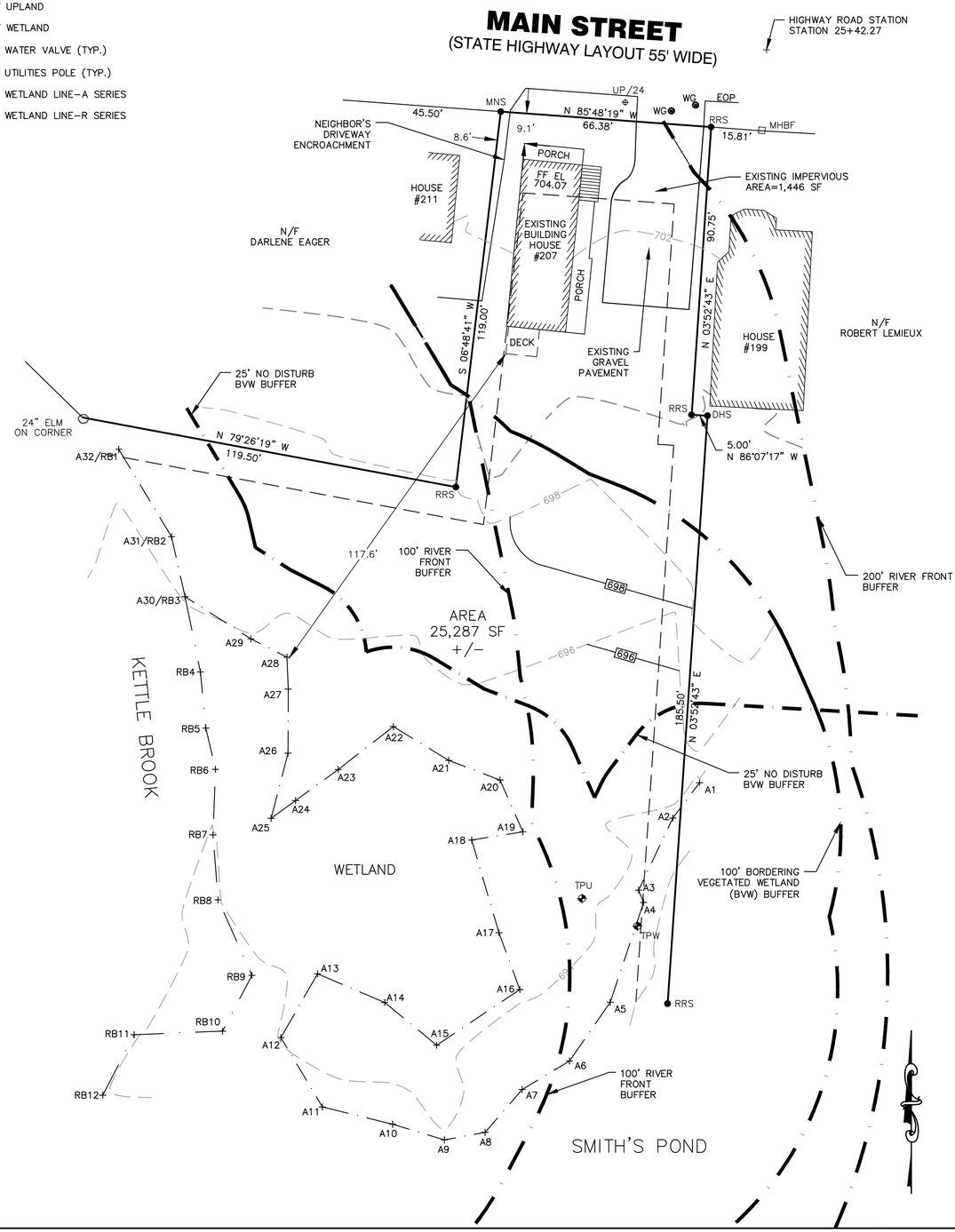
ZONING SUMMARY TABLE

ZONING REGULATION	REQUIRED/ALLOWED	PROPOSED DWELLING
MINIMUM LOT AREA	22,500 SF	25,287 SF
MINIMUM LOT FRONTAGE	100 FT	66.38 FT*
MINIMUM FRONT YARD SETBACK	25 FT	9.1 FT**
MINIMUM SIDE YARD SETBACK	10 FT	8.6 FT**
MINIMUM REAR YARD SETBACK	25 FT	117.6 FT
MAXIMUM BUILDING COVERAGE	30%	5.2%
MAXIMUM HEIGHT (IN FEET)	35 FT	<35 FT

*PRE–EXISTING NON–CONFORMING LOT
**PRE–EXISTING NON–CONFORMING STRUCTURE

LEGEND & ABBREVIATION

PROPERTY LINE	
702	EXISTING CONTOURS
MHBF	EXISTING MASS. HIGHWAY BOUND FOUND
DHS	DRILLED HOLE SET (TYP.)
RRS	REBAR ROD SET (TYP.)
MNS	MAGNET NAIL SET (TYP.)
EOP	EXISTING EDGE OF PAVEMENT
TPU	TEST PIT UPLAND
TPW	TEST PIT WETLAND
WG	EXISTING WATER VALVE (TYP.)
UP/24	EXISTING UTILITIES POLE (TYP.)
	EXISTING WETLAND LINE–A SERIES
	EXISTING WETLAND LINE–R SERIES



20 0 20 40 60

HORIZONTAL SCALE 1"=20'

NOT FOR CONSTRUCTION

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LEICESTER CLERK DATE

PLAN REVISIONS:

NO.	DATE	DESCRIPTION	BY

LEICESTER PLANNING BOARD APPROVED:

BEING A MAJORITY OF THE LEICESTER PLANNING BOARD:

ENDORSED APPROVED DATE:

COMMONWEALTH OF MASSACHUSETTS HOSSEIN HAGHANJADEH CIVIL NO. 42529 REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS DANIEL J. TIVNAN NO. 40047 REGISTERED PROFESSIONAL LAND SURVEYOR

H. S. & T. GROUP, INC.
PROFESSIONAL CIVIL ENGINEERS & LAND SURVEYORS
75 HAMMOND STREET – 2ND FLOOR
WORCESTER, MASSACHUSETTS 01610–1723
PHONE: (508) 757–4944 FAX: (508) 752–8895
EMAIL: INFO@HSTGROUP.NET WWW.HSTGROUP.NET

EXISTING CONDITIONS

207 MAIN STREET, LEICESTER, MA 01611

APPLICANT/OWNER:
JUSSEMAR DEJESUS
207 MAIN STREET, LEICESTER, MA 01611

DATE: 11/07/2016	COMP'D: DJT	FIELD:	PS
SCALE: 1"=20'	CAD: YZ	FLD. BK:	647–2
ZONE: BUSINESS	REV'D: HH	DWG:	MAINST–207–SITEPLAN
JOB NUMBER: 6083		SHEET NUMBER	1 OF 3
DWG NUMBER: 5062			

NOTES:

1. ELEVATIONS SHOWN HEREON ARE REFERENCED NAVD 88 DATUM FOR LOCATION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL CONTROL POINTS AND BENCHMARKS NECESSARY FOR THE WORK.
3. THE USDA NATURAL RESOURCES CONSERVATION SERVICE (NRCS) WEB SOIL SURVEY DESIGNATES THE SOILS FOR THIS PARCEL AS SWANSEA MUCK, 0–1% SLOPES, AND CANTON FINE SANDY LOAM, 3–8% SLOPES. THESE SOILS ARE RATED AS HYDROLOGIC SOIL GROUP B/D SOILS AND A SOILS RESPECTIVELY.
4. ALL REQUIRED PERMITS SHALL BE SECURED BY THE OWNER OR CONTRACTOR PRIOR TO COMMENCING WORK.
5. ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION. CONTRACTOR MUST VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES AFFECTED BY THE WORK PRIOR TO CONSTRUCTION. CONTRACTOR SHALL ASSUME ALL LIABILITY ASSOCIATED WITH THE VERIFICATION, DISTURBANCE AND/OR REPLACEMENT OF ALL EXISTING UTILITIES ENCOUNTERED PRIOR TO OR DURING CONSTRUCTION. CONTRACTOR SHALL CALL "DIG–SAFE" (811) 72 HOURS PRIOR TO CONSTRUCTION (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS).
6. ALL UTILITY WORK SHALL CONFORM TO THE TOWN OF LEICESTER STANDARD SPECIFICATIONS AND DETAILS.
7. ANY WORK IN AN EXISTING TOWN ROAD WILL REQUIRE A ROAD OPENING PERMIT FROM TOWN OF LEICESTER.
8. THE CONTRACTOR SHALL MAINTAIN COMPLETE RECORDS OF AS–BUILT LOCATIONS OF ALL UNDERGROUND AND ABOVE GROUND UTILITIES. THE CONTRACTOR SHALL PROVIDE THE CITY AND H. S. & T. GROUP WITH COMPLETE AS–BUILT PLANS UPON COMPLETION OF THE PROJECT.
9. ALL UTILITY COVERS OR OTHER SURFACE ELEMENTS INTENDED TO BE EXPOSED AT GRADE SHALL BE FLUSH WITH THE ADJACENT FINISHED GRADE ELEVATIONS AND ADJUSTED TO PROVIDE A SMOOTH TRANSITION AT ALL EDGES.
10. THE CONTRACTOR SHALL SET SUBGRADE ELEVATIONS TO ALLOW FOR POSITIVE DRAINAGE AND PROVIDE EROSION CONTROL DEVICES, STRUCTURES, MATERIALS AND CONSTRUCTION METHODS TO DIRECT SILT MIGRATION AWAY FROM DRAINAGE AND OTHER UTILITY SYSTEMS, PUBLIC STREETS AND WORK AREAS.
11. ALL PROPOSED PAVEMENT AREAS SHALL BE PITCHED AS SHOWN ON THE DRAWINGS. IF NOT OTHERWISE SHOWN, PROPOSED PAVEMENT AREAS SHALL BE PITCHED A MINIMUM OF 1% (1/8" PER FOOT) TO PROVIDE POSITIVE DRAINAGE.
12. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE ENGINEER.
13. ALL GRADING IS TO BE SMOOTH AND CONTINUOUS WHERE PROPOSED PAVEMENT MEETS EXISTING PAVEMENT. EXISTING PAVEMENT EDGES ARE TO BE SAW CUT. THE PAVEMENT JOINTS ARE TO BE EMULSION OILED AND SANDED.
14. PROPOSED DRAIN AND SEWER SERVICES SHALL BE SLOPED TO PROVIDE POSITIVE FLOW AWAY FROM THE PROPOSED DWELLING. THE MINIMUM PIPE SLOPE FOR ANY PROPOSED DRAIN OR SEWER LINE SHALL BE 1%.
15. ALL ROOF DRAINS SHALL BE INSTALLED TO A POINT 10 FEET FROM THE BUILDING WALL UNLESS OTHERWISE NOTED OR DETAILED.
16. DOMESTIC WATER SERVICES SHALL BE INSTALLED WITH APPROPRIATELY SIZED GATE, BOX AND TEE FITTINGS.
17. PRESSURE AND LEAKAGE TESTING, DISINFECTION AND FLUSHING SHALL BE IN ACCORDANCE WITH ALL LOCAL MUNICIPAL STANDARDS AND REQUIREMENTS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS IN CONNECTION WITH UTILITY TESTS, FLUSHING AND INSPECTION AS REQUIRED BY THE LOCAL MUNICIPALITY.
18. THE PRIMARY WATER METER (AND BACKFLOW PREVENTER, IF REQUIRED) SHALL BE LOCATED AT THE POINT WHERE THE WATER LINE ENTERS THE BUILDING UNLESS OTHERWISE NOTED OR DETAILED ON THE DRAWINGS.
19. EXACT LOCATION OF UTILITY STUBS FOR BUILDING CONNECTIONS SHALL BE VERIFIED WITH THE BUILDING DRAWINGS. SERVICE STUBS TO THE BUILDINGS SHALL BE INSTALLED TO A POINT 10 FEET FROM THE BUILDING WALL UNLESS OTHERWISE NOTED OR DETAILED.
20. ALL WATER AND SEWER CONSTRUCTION SHALL BE INSPECTED BY THE TOWN OF LEICESTER BEFORE BEING BACKFILLED. THE TOWN SHALL BE NOTIFIED AT LEAST 24 HOURS PRIOR TO THE REQUIRED INSPECTION.
21. IRRIGATION SYSTEMS SHALL NOT BE CONNECTED TO THE MUNICIPAL WATER SUPPLY. IRRIGATION SYSTEMS SHALL ONLY BE INSTALLED AND CONNECTED TO A PRIVATE IRRIGATION WELL.
22. ALL UNDERGROUND CONDUITS SHALL BE INSTALLED WITH TRACER TAPE.
23. ELECTRIC AND TELECOMMUNICATIONS SERVICES TO THE PROPOSED DWELLING SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY.

PARKING SPACE USE

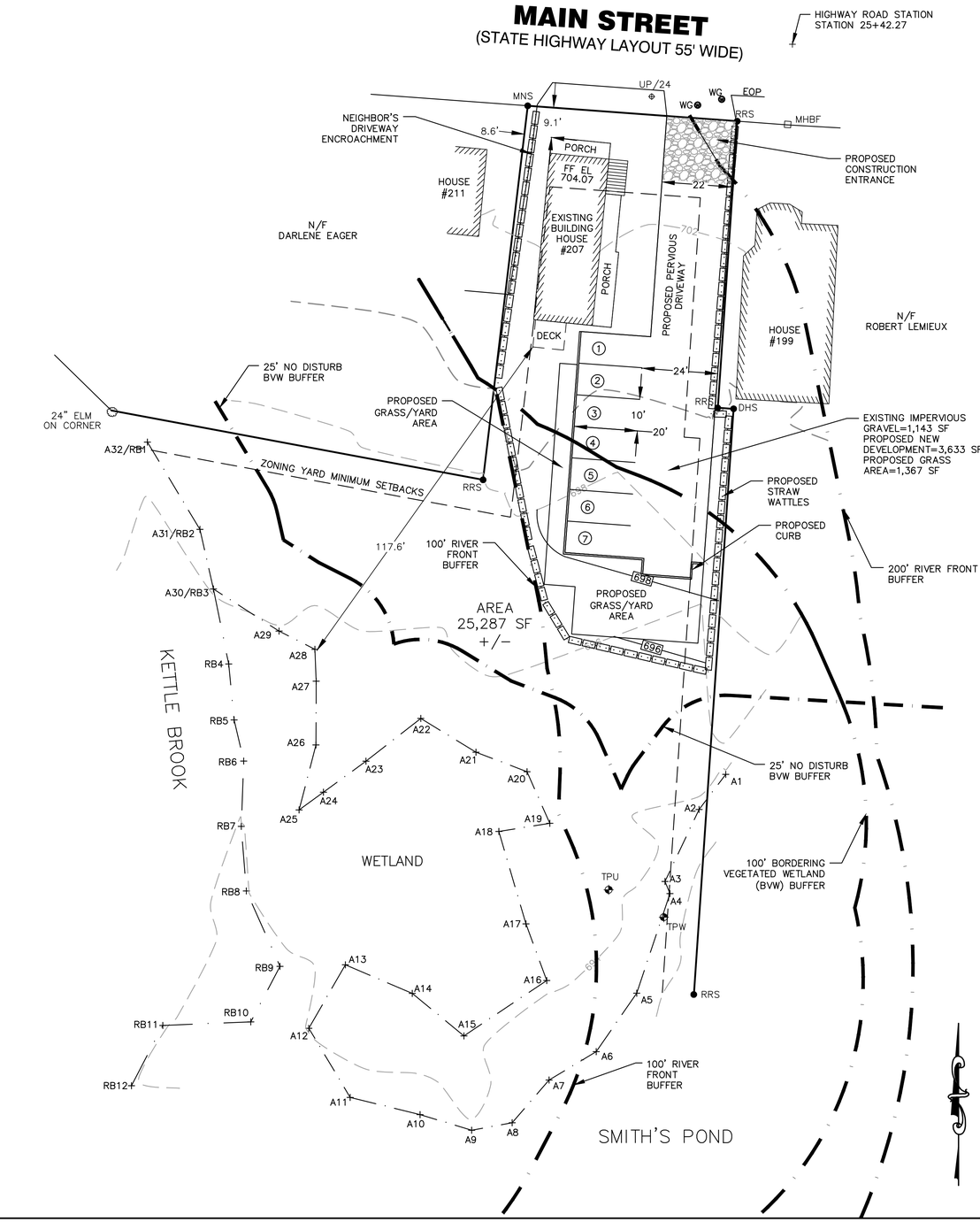
USE	REQUIRED	PROVIDED
MULTI–FAMILY DWELLING (2–UNITS ON SECOND FLOOR)	2 SPACES PER DWELLING UNIT FOR UNITS FOR 2 OR MORE BEDROOMS	4 SPACES ~ (2 SPACES PER UNIT)
BUSINESS AND PROFESSIONAL OFFICES	1 SPACE PER 350 SF GROSS FLOOR AREA (EXISTING FIRST FLOOR=990 SF)	3 SPACES
TOTAL		7 SPACES

LEGEND & ABBREVIATION

- PROPERTY LINE
- 702 EXISTING CONTOURS
- MHBF EXISTING MASS. HIGHWAY BOUND FOUND
- DHS DRILLED HOLE SET (TYP.)
- RRS REBAR ROD SET (TYP.)
- MNS MAGNET NAIL SET (TYP.)
- EOP EXISTING EDGE OF PAVEMENT
- TPU TEST PIT UPLAND
- TPW TEST PIT WETLAND
- WG EXISTING WATER VALVE (TYP.)
- UP/24 EXISTING UTILITIES POLE (TYP.)
- EXISTING WETLAND LINE–A SERIES
- EXISTING WETLAND LINE–R SERIES
- (7) PROPOSED PARKING SPACE LABEL (TYP.)
- 696 PROPOSED CONTOUR

IMPERVIOUS AND PERVIOUS AREA SUMMARY

TOTAL LOT AREA	25,287 SF
TOTAL AREA EXISTING ON THE LOT BETWEEN 0–200' RIVERFRONT BUFFER	25,138 SF
EXISTING IMPERVIOUS AREA	1,446 SF
PROPOSED IMPERVIOUS AREA REUSED FROM EXISTING AREA	1,143 SF
PROPOSED NEW DEVELOPMENT AREA	3,633 SF
PROPOSED GRASS/YARD AREA	1,367 SF
TOTAL AREA OF PROPOSED CONDITIONS	6,143 SF



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HORIZONTAL SCALE 1"=20'

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BEING A MAJORITY OF THE LEICESTER PLANNING BOARD:

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COMMONWEALTH OF MASSACHUSETTS DANIEL J. TIVNAN NO. 40047 REGISTERED PROFESSIONAL LAND SURVEYOR

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SITE PLAN

207 MAIN STREET, LEICESTER, MA 01611

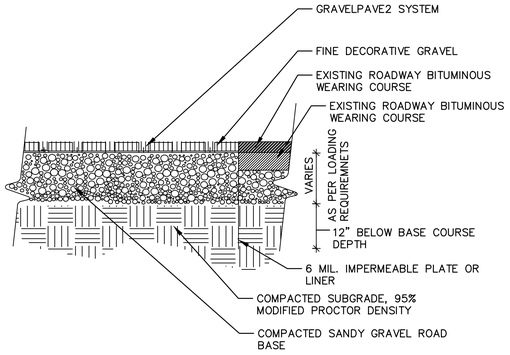
APPLICANT/OWNER:
JUSSEMAR DEJESUS
207 MAIN STREET, LEICESTER, MA 01611

DATE: 11/07/2016	COMP'D: DJT	FIELD:	PS
SCALE: 1"=20'	CAD: YZ	FLD. BK:	647–2
ZONE: BUSINESS	REV'D: HH	DWG:	MAINST–207–SITEPLAN

JOB NUMBER: 6083

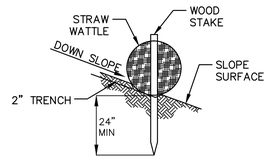
DWG NUMBER: 5062

SHEET NUMBER 2 OF 3



GRAVELPAVE2 AT ASPHALT EDGE

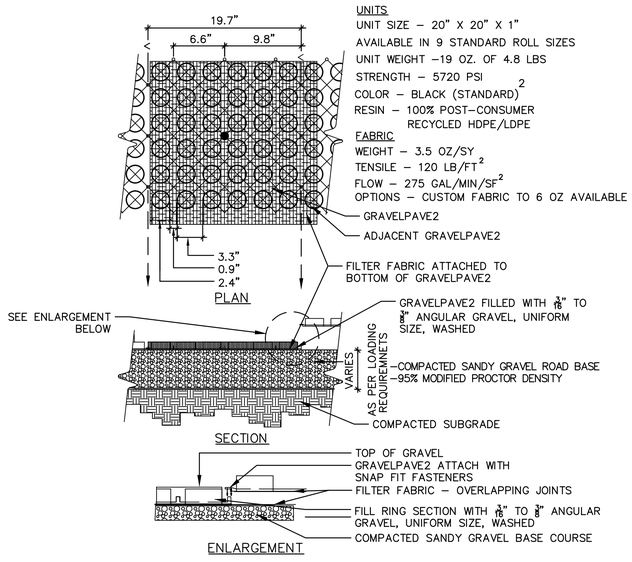
NTS



STAKE DETAIL
(ON BARE GROUND)

TEMPORARY STRAW WATTLES DETAIL

NTS



SPECIFICATIONS

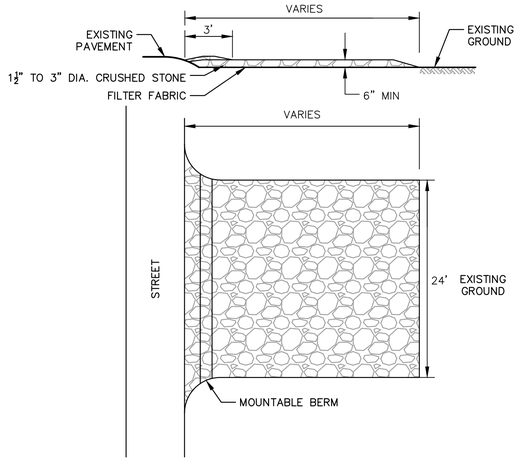
UNITS
UNIT SIZE – 20" X 20" X 1"
AVAILABLE IN 9 STANDARD ROLL SIZES
UNIT WEIGHT –19 OZ. OF 4.8 LBS
STRENGTH – 5720 PSI
COLOR – BLACK (STANDARD)
RESIN – 100% POST–CONSUMER RECYCLED HDPE/LDPE

FABRIC
WEIGHT – 3.5 OZ/SY
TENSILE – 120 LB/FT^2
FLOW – 275 GAL/MIN/SF^2
OPTIONS – CUSTOM FABRIC TO 6 OZ AVAILABLE

GRAVELPAVE2
ADJACENT GRAVELPAVE2
FILTER FABRIC ATTACHED TO BOTTOM OF GRAVELPAVE2
GRAVELPAVE2 FILLED WITH ⅜" TO ⅝" ANGULAR GRAVEL, UNIFORM SIZE, WASHED
COMPACTED SANDY GRAVEL ROAD BASE –95% MODIFIED PROCTOR DENSITY
COMPACTED SUBGRADE
FILL RING SECTION WITH ⅜" TO ⅝" ANGULAR GRAVEL, UNIFORM SIZE, WASHED

TYPICAL GRAVELPAVE2 DETAIL

NTS



NOTE:
THE MOUNTABLE BERM SHALL BE USED TO ASSIST REMOVAL OF MUD FROM THE TIRES OF VEHICLES LEAVING THE SITE DURING CONSTRUCTION.

STABILIZED CONSTRUCTION ENTRANCE

NTS

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DETAIL

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JOB NUMBER: 6083

DWG NUMBER: 5062

SHEET NUMBER 3 OF 3