EcoTec, Inc.

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

January 26, 2021

Mr. Albert Chin
25 Bernard Street
Needham, MA 02461

RE: NOI Site Report for 25 Bernard Street, Newton, Massachusetts

Dear Mr. Chin:

This Notice of Intent has been filed under the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40; the "Act") and its implementing regulations (310 CMR 10.00 *et seq.*; the "Regulations") and the Newton Floodplain Ordinance (Section 22-22; the "Ordinance"). The City of Newton does not have a wetlands protection ordinance.

The subject site consists of 0.23± acres (10,000 square feet) of land located to the southwest of Bernard Street and northwest of Bank Street in the Newton Highlands section of Newton, Massachusetts. A fully developed residential lot at 15 Bank Street occurs between the subject site and the Charles River. The subject site is developed with a single-family house with rear deck with stairs, paved driveway to Bank Street and driveway opening to Bernard Street, bluestone front walk with concrete front stairs, lawn, and landscaping consisting of forsythia, rhododendron, and yew shrubs. No trees occur on the subject lot; trees located off-site near the western and northern property boundaries include eastern hemlock (*Tsuga canadensis*), willow (*Salix sp.*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and northern red oak (*Quercus rubra*). Roof runoff is collected in gutters and transferred to the ground surface via downspouts and splash blocks; driveway runoff is not presently collected or treated. One catch basin occurs within Bernard Street to the east of the subject site. The wetland resources observed on and near the subject site are described in a separate Wetland Resource Evaluation which is included as part of the Notice of Intent filing.

Project Description and Analysis

The subject site is 10,000± square feet in size and the western 3,725± square feet of the site is located within the outer portion of the Riverfront Area of the Charles River. No other wetland resource areas or the 100-foot Buffer Zone to a resource area occur on the subject site. A fully developed residential lot at 15 Bank Street occurs between the subject site and the Charles River.

The proposed project consists of the demolition of the existing 1,123± square foot single-family house with one-car garage and associated site features including a paved driveway, front walkway, and rear deck with stairs and the construction of a 2,215± square foot single-family house with a two-car garage and front porch, paved driveway, front and side walkways and stairs, paver patio, and associated retaining walls, grading, lawn, and landscaping. The project also includes a proposed trench drain, manhole sump, and significant infiltration system to address driveway and roof runoff that has been sized to address the proposed impervious surfaces without consideration of the

existing impervious surfaces on the site. Lastly, a 960± square foot enhancement planting area in the Riverfront Area is proposed to mitigate for the net 467± square foot increase in total impervious surfaces within the Riverfront Area on the site. Any disturbed lawn and landscaped areas will be graded and will be loamed and seeded with a grass seed mixture to provide permanent cover or will be landscaped. Alternatively, sod may be used to establish lawn areas. The proposed limit of work will be demarcated in the field by the erosion control barrier as shown on the Site Plan. Soil will be temporarily stored on-site outside of the Riverfront Area in covered stockpiles within the limit of work on the site with excess soil trucked from the site.

Under existing conditions, the site is developed with a 1,123± square foot single-family house with a one-car garage, paved driveway, front walkway, a rear deck with stairs, and associated lawn and landscaping. No trees occur on the site. As the deck could qualify as a minor exempt activity, it was not considered as degraded area in this analysis. A total of 2,078± square feet of impervious surfaces associated with the house, driveway, and walkway occur on the site with 128± square feet of impervious surface associated with the driveway and stairwell beneath the deck located within the Riverfront Area. The existing house is located 204± feet, the existing paved driveway is located 193± feet, and the existing stairwell is located 197± feet from the Charles River. Existing driveway and roof runoff discharge essentially unchecked to the ground surface.

Under proposed conditions, the site will be redeveloped with a 2,215± square foot single-family house with a two-car garage and front porch, paved driveway, front and side walkways and stairs, paver patio, and associated retaining walls, grading, lawn, and landscaping. The existing fences near the western and northern site boundaries will be retained. A total of 3,689± square feet of impervious surfaces associated with the house with porch, paved driveway, walkways and stairs, retaining walls, and patio occur on the site with 595± square feet of impervious surfaces associated with the house, side walkway and stairs, and retaining walls proposed within the Riverfront Area. The proposed patio, which is partially located in the Riverfront Area, is a minor exempt activity. The project includes the installation of new underground utilities and project associated grading, lawn, and landscaping. The proposed house is located 189± feet, the proposed driveway is located 226± feet, the walkway and stairs are located 189± feet, and the closest retaining wall is located 185± feet from the Charles River. Proposed driveway runoff, which is collected and pretreated through a trench drain and manhole sump, and roof runoff will be routed to a proposed infiltration system. A 960± square feet enhancement planting area within the Riverfront Area is proposed to address the 467± square foot increase in impervious surfaces in the Riverfront Area on the site. Compliance with the applicable performance standards for work in the Riverfront Area is discussed in a subsequent section of this letter.

Enhancement Planting Area Plan

An enhancement planting area totaling 960± square feet in size (or 9.6% of the lot) will be established within the Riverfront Area. The trees on the abutting lot provide adequate tree layer coverage in this general area; as such, saplings are not proposed as part of the planting plan. The proposed plantings include twenty-eight (28) native shrubs of six species 3 to 5 feet in height and twenty-eight (28) small native shrubs and ground cover of four species 0.5 to 2 feet in height will be established within the Riverfront Area in the western portion of the site. These plantings will serve to stabilize this area, reduce stormwater runoff, and provide enhanced wildlife habitat, including cover, perching, and foraging habitat, compared to the existing condition. The existing lawn grass in this area will be cut

very short/scalped prior to planting. The proposed shrubs and ground cover will be spaced under the supervision of a qualified wetland scientist and planted in accordance with current landscaping practices (i.e., hole twice as wide and as deep as the root ball with the area around the root ball backfilled with high quality loamy top soil). The proposed plant species listing is provided in the planting table on the Site Plan; the selected species are native and have been selected based upon the conditions of the proposed planting area. If a species is not available, a substitution will be recommended by the wetland scientist and approved by Conservation Staff. The excess soil will be removed from the site. Following installation, the area will be initially mulched with a 3- to 4-inch-thick layer of partially decomposed leaf litter with some natural bark mulch as specified as a note to the planting table. This will aid in keeping the plantings moist and will provide temporary cover and habitat value until leaves begin to accumulate in this area. This area is not a landscaped area and mulch application in the area will diminish with time. The woody materials will be watered regularly for a period of four weeks, and will be watered, as necessary, if evidence of stress is observed. As shown on the Site Plan, the project side of the enhancement planting area will be demarcated with three stone bounds set such that they extend a minimum of 4 inches above the ground surface.

Enhancement Planting Area Monitoring: The enhancement planting area will be monitored near the end of the growing season for two years after it is established. During each inspection, which will be conducted by a qualified wetland scientist, the condition of the area and the number and species of shrubs and ground cover and their condition will be documented. Photographs of the area shall be taken, and representative photographs shall be included in the report. To be considered a success, the shrub and ground cover plantings shall have a 75% survival rate by strata (or survival rate specified in the Order) at the end of the second growing season after establishment. The findings of each inspection will be documented in a report that will be submitted in a timely manner to the Commission. Each report will include any necessary recommendations to bring the area into compliance.

Compliance Evaluation under the Regulations

The proposed project is a mixture of new and redevelopment activities within the Riverfront Area to the Charles River. An existing developed single-family house lot occurs between the site and the Charles River. Certain activities which are proposed within previously developed but not degraded areas of the site, are required to meet the general performance standards for Riverfront Area found at 310 CMR 10.58(4). Activities proposed within previously developed and degraded areas of the site are required to meet applicable standards at 310 CMR 10.58(4) and all the performance standards for a redevelopment project set forth at 310 CMR 10.58(5). The proposed project has been designed as shown on the Site Plan and described within this letter to meet applicable general performance standards for Riverfront Area found at 310 CMR 10.58(4) and the performance standards for redevelopment of the Riverfront Area at 310 CMR 10.58(5), as applicable. Due to the age of the lot, the amount of Riverfront Area on the site, and the proposed area of disturbance within the Riverfront Area, this project could simply be permitted under the general performance standards for Riverfront Area. A discussion of compliance with the above-referenced standards is as follows:

Riverfront Area: Section 10.58(4) of the Regulations provides the general performance standards for work within the Riverfront Area, which states:

(*4) General Performance Standard. Where the presumption set forth in 310 CMR 10.58(3) is not overcome, the applicant shall prove by a preponderance of the evidence that there are no practicable and substantially equivalent economic alternatives to the proposed project with less adverse effects on the interests identified in M.G.L. c.131 § 40 and that the work, including proposed mitigation, will have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. In the event that the presumption is partially overcome, the issuing authority shall make a written determination setting forth its grounds in the Order of Conditions and the partial rebuttal shall be taken into account in the application of 310 CMR 10.58 (4)(d)1.a. and c.; the issuing authority shall impose conditions in the Order that contribute to the protection of interests for which the riverfront area is significant.*

(a) Protection of Other Resource Areas. The work shall meet the performance standards for all other resource areas within the riverfront area, as identified in 310 CMR 10.30 (coastal bank), 10.32 (salt marsh), 10.55 (Bordering Vegetated Wetland), and 10.57 (Land Subject to Flooding). When work in the riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of the interests of M.G.L. c. 131, § 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within the riverfront area.

Work associated with the project is proposed within the outer Riverfront Area to the Charles River. An existing developed single-family house lot occurs between the site and the Charles River. No other wetland resource areas or associated Buffer Zone occur on the site. As such, no work is proposed within Land Under Water Bodies and Waterways, Bank, Bordering Vegetated Wetlands, or Bordering or Isolated Land Subject to Flooding. In addition, no work is proposed within the 100-foot Buffer Zone to Bank; the 100-foot Buffer Zone is not a wetland resource area under the Regulations.

(b) Protection of Rare Species. No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 or 10.37, or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent.

Based upon the NHESP Atlas, 14th Edition, dated August 1, 2017, the site is not located within a mapped Estimated Habitat or Priority Habitat and no mapped Certified Vernal Pools occur on or near the site. As such, the proposed project will not have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, and will not have any adverse effect on vernal pool habitat.

(c) Practicable and Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40….”

The lot was created in 1964. The current owner acquired the site on April 1, 1982 and has no interest or control over adjacent or abutting properties. Again, the subject site is 10,000± square feet in size and 3,725± square feet of the site is located within the Riverfront Area of the Charles River. An existing developed single-family house lot occurs between the site and the Charles River. The project purpose is to demolish the existing single-family house and associated site features and construct a

new single-family house with associated site features on the site. An approximately 128± square foot portion of the proposed house is located within the footprint of the existing driveway and the stairwell beneath the deck in the Riverfront Area. The work proposed within degraded areas within the Riverfront Area is exempt from the requirements for an alternatives analysis and will be addressed under the redevelopment standards in a subsequent section of this letter. The balance of the proposed project is subject to the general performance standards.

The proposed house has a footprint that has been increased to 2,215± square feet from the existing house footprint of 1,123± square feet. The site has frontage on both Bernard Street and Bank Street resulting in two front yard setbacks restricting where the proposed house can be located on the site. The house has been set near the two front yard setbacks, meets the rear and side yard setbacks, and is slightly closer to the Charles River than the existing house and existing driveway. The proposed driveway has been relocated entirely outside of the Riverfront Area and has been sized to allow access to the proposed two-car garage. Reducing the house footprint and moving the house further from the Charles River in a manner that does not affect the project economics does not reduce the impacts on the statutory interests. In other words, given the nature of construction costs and property valuation, a proposed project with a somewhat smaller footprint would not represent an economically equivalent project but would have similar adverse effects on the statutory interests. This proposed project, including mitigation measures for stormwater and plantings, represents an improvement over existing conditions relative to the protection of the statutory interests.

> *(d) No Significant Adverse Impact. The work, including proposed mitigation measures, must have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131, § 40…."*

The subject site is 10,000± square feet in size and 3,725± square feet of the site is located within the Riverfront Area of the Charles River. An existing developed single-family house lot occurs between the site and the Charles River. An approximately 128± square foot portion of the proposed house is located within the footprint of the existing driveway and the stairwell beneath the deck in the Riverfront Area. The work proposed within degraded areas within the Riverfront Area is exempt from the requirements for a no significant adverse impact analysis and will be addressed under the redevelopment standards in a subsequent section of this letter. The balance of the proposed project is subject to the general performance standards.

The proposed house has a footprint that has been increased to 2,215± square feet from the existing house footprint of 1,123± square feet. Meeting the two front yard setbacks and the side yard setback results in the larger house being located partially within the outermost portion of the Riverfront Area. A total of 462± square feet of the proposed house is located within the Riverfront Area; this area currently consists of driveway, deck and stairs, and lawn. The proposed driveway has been relocated entirely outside of the Riverfront Area. The balance of the proposed work in the Riverfront Area is for the installation of retaining walls, a short segment of walkway and stairs, and associated grading, lawn, and landscaping. The proposed project has been designed to and will result in an improvement over the existing condition. The proposed project includes stormwater management features to address driveway and roof runoff and will enhance 960± square feet of the Riverfront Area (or 9.6% of the site) in a bounded enhancement planting area with native shrub and ground cover plantings which will serve to enhance wildlife habitat features and serve to improve the capacity of the

Riverfront Area on the site to protect the statutory interests presumed to be significant within the Riverfront Area.

Redevelopment activities associated with the proposed project are located within the limit of the existing degraded areas. The total existing degraded area in the Riverfront Area on the site is 128± square feet; the total proposed degraded area in the Riverfront Area on the site is 595± square feet. The proposed project results in an increase in impervious surfaces on the site of 1,611± square feet compared to the existing condition including a net increase in impervious surfaces within the Riverfront Area on the site of 467± square feet. Significant stormwater improvements and a 960± enhancement planting area are proposed as mitigation and to serve as an improvement over the existing condition.

The total area of Riverfront Area within the limit of work on the site, excluding proposed mitigation, is 2,765± square feet, including both new development and redevelopment activities. Given the age of the lot, the overall proposed Riverfront Area alteration is below the threshold of 5,000 square foot or 10%, whichever is greater. The proposed project is exempt from stormwater management standards under the Regulations; the proposed project includes significant stormwater management features to address driveway and roof runoff under City of Newton requirements. Drainage calculations are provided in the Drainage Report prepared by VTP Associates, Inc. which are included as part of the Notice of Intent. The Drainage Report also includes an Operations and Maintenance Plan. Given the previously developed nature of the Riverfront Area on and near the site and the presence of a completely developed lot between the site and the Charles River, the proposed project will not impair the capacity of the Riverfront Area to provide important wildlife habitat functions. A bounded 960± square foot enhancement planting area will be established within the Riverfront Area on the site. The proposed project will serve to augment the wildlife habitat characteristics of the Riverfront Area on the site through proposed native shrub and ground cover plantings. The proposed project incorporates erosion control barriers at the limit of work. This barrier will serve as a limit of work and will serve to protect groundwater and surface water quality from non-point source pollution.

Section 10.58(5) of the Regulations provides the performance standards for redevelopment within previously developed and degraded Riverfront Area, which states:

> *Redevelopment Within Previously Developed Riverfront Areas; Restoration and Mitigation. Notwithstanding the provisions of 310 CMR 10.58(4)(c) and (d), the issuing authority may allow work to redevelop a previously developed riverfront area, provided the proposed work improves existing conditions. Redevelopment means replacement, rehabilitation or expansion of existing structures, improvement of existing roads, or reuse of degraded or previously developed areas. A previously developed riverfront area contains areas degraded prior to August 7, 1996 by impervious surfaces from existing structures or pavement, absence of topsoil, junkyards, or abandoned dumping grounds. Work to redevelop previously developed riverfront areas shall conform to the following criteria:*
>
> *(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.*

The subject site is 10,000± square feet in size and 3,725± square feet of the site is located within the Riverfront Area of the Charles River. An existing developed single-family house lot occurs between the site and the Charles River. The balance of the proposed project meets the general performance standards as detailed above.

The proposed project has been designed to and will result in an improvement over the existing condition. A total of 462± square feet of the proposed house is located within the Riverfront Area; this area currently consists of driveway, deck and stairs, and lawn. An approximately 128± square foot portion of the proposed house is located within the footprint of the existing driveway and the stairwell beneath the deck in the Riverfront Area. The proposed driveway has been relocated entirely outside of the Riverfront Area. The balance of the proposed work in the Riverfront Area is for the installation of retaining walls, a short segment of walkway and stairs, and associated grading, lawn, and landscaping. The proposed project includes stormwater management features not required under the Regulations to address both driveway and roof runoff; no such features are present under the existing condition. The project will also enhance 960± square feet of lawn in the Riverfront Area with native shrub and ground cover plantings which will serve to enhance wildlife habitat features and serve to improve the capacity of the Riverfront Area on the site to protect the statutory interests presumed to be significant within the Riverfront Area.

(b) Stormwater management is provided according to standards established by the Department.

The proposed project is exempt from stormwater management standards under the Regulations. The project includes a proposed trench drain, manhole sump, and significant infiltration system to address driveway and roof runoff in accordance with City of Newton requirements. This system has been sized to address the proposed impervious surfaces without consideration of the existing impervious surfaces on the site. Drainage calculations are provided in the Drainage Report prepared by VTP Associates, Inc. which are included as part of the Notice of Intent. The Drainage Report also includes an Operations and Maintenance Plan.

(c) Within 200-foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25-foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

Redevelopment activities associated with the proposed project are not closer to the river than the existing condition. The balance of the proposed work meets the general performance standards at 310 CMR 10.58(4).

(d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

Redevelopment activities associated with the proposed house total 128± square feet and are located within the limit of the existing degraded areas. The balance of the proposed work meets the general performance standards at 310 CMR 10.58(4).

(e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

Redevelopment activities associated with the proposed project do not exceed the amount of existing degraded area on the site. The balance of the proposed work meets the general performance standards at 310 CMR 10.58(4).

(f) When an applicant proposes restoration on-site of degraded riverfront area, alteration ay be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include:
1. removal of all debris, but retaining any trees or other mature vegetation;
2. grading to a topography which reduces runoff and increases infiltration;
3. coverage by topsoil at a depth consistent with natural conditions at the site; and
4. seeding and planting with an erosion control seed mixture, followed by plantings of herbaceous and woody species appropriate to the site.

Restoration of degraded Riverfront Area on the site is not proposed as part of this project.

(g) When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c. 184, §§ 31 to 33 to preserve undisturbed riverfront areas that could be otherwise altered under 310 CMR 10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131, § 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary of the Executive Office of Environmental Affairs.

An enhancement planting area totaling 960± square feet in size (or 9.6% of the lot) will be established within the Riverfront Area. Again, it must be noted that an existing developed single-family house lot occurs between the site and the Charles River. The proposed plantings include twenty-eight (28) native shrubs of six species 3 to 5 feet in height and twenty-eight (28) small native shrubs/ground cover of four species 0.5 to 2 feet in height which will be established within the Riverfront Area in the western portion of the site. These plantings will serve to stabilize this area, reduce stormwater runoff, and provide enhanced wildlife habitat, including cover, perching, and foraging habitat, compared to the existing condition. The proposed shrub and ground cover plantings in this area will provide enhanced wildlife habitat, including cover, perching, and foraging habitat, compared to the existing condition on the site. The enhancement planting area will be monitored near the end of the growing

season for two years after it is established with 75% survival by strata (or survival rate specified in the Order) after two growing seasons the threshold for success.

> *(h) The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.*

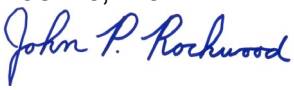
Enhancement of Riverfront Area is proposed as part of this project in the form of a bounded 960± enhancement planting area as shown on the Site Plan. As such, the applicant is not averse to the above-referenced continuing condition on these bounded areas.

Conclusion

In conclusion, it is EcoTec's opinion, based upon the information provided on the Site Plan and in this letter, that the proposed project meets the general performance standards and redevelopment standards for work within the Riverfront Area under the Regulations. The proposed project results in an increase in impervious area on the site and in the Riverfront Area; mitigation in the form of stormwater improvements and enhancement plantings have been provided as part of the project. This plan as proposed meets the applicable performance standards and by regulation serves to protect the statutory interests.

EcoTec hopes that you find this information helpful. If you have any questions, please feel free to contact me at any time.

Cordially,
ECOTEC, INC.



John P. Rockwood, Ph.D., SPWS
Chief Environmental Scientist

18/wr/NEWTON25BERNARD SITE REPORT

DRAINAGE REPORT
25 BERNARD STREET
NEWTON, MASSACHUSETTS

Date: January 15, 2021

Reviewed by:
Marc Besio, PE, SIT

VTP Associates, Inc.
132 Adams Street
2nd Floor, Suite 3
Newton Massachusetts 02465
1-617-332-8271
Job # 220150

IMPERVIOUS AREAS

Date: January 15, 2021

Address: 25 Bernard Street

Project: 220150

Impervious Areas	Existing	Proposed
Buildings & Overhangs	0.0 s.f.	2,138.8 s.f.
Porch	0.0 s.f.	76.2 s.f.
Walls and curbing	0.0 s.f.	190.4 s.f.
Driveway	0.0 s.f.	758.1 s.f.
Walkways, Landings, & stairs	0.0 s.f.	270.8 s.f.
Patios	0.0 s.f.	208.4 s.f.
Total	**0.0 s.f.**	**3,642.7 s.f.**

Increase in Impervious Area: 3,642.7 - 000.0 = 3,642.7 s.f.

Lot area: 10,000.0 s.f.

4% of lot area: 400.0 s.f.

3,642.7 s.f. > 400.0 s.f. Drainage Required

DRAINAGE SUMMARY

Project Location: 25 Bernard Street **Lot Area:** 10,000 sq. ft. = 0.230 acres
Project Number: 220150 **Date:** 1/15/2021

IMPERVIOUS AREAS:

Existing Conditions:

Impervious Area:	0 sq. ft. / 43560 sq. ft. / acre	= 0.000 acres
Pervious Area:	10,000 sq. ft. / 43560 sq. ft. / acre	= 0.230 acres

Runoff Coefficient (weighted):

0.0000 acres	x 0.95 =	0.0000 acres		
0.2296 acres	x 0.35 =	0.0804 acres		
0.230 acres		**0.080 acres**	**/ 0.230 acres**	**= 0.348**

Proposed Conditions:

Impervious Area:	3,643 sq. ft. / 43560 sq. ft. / acre	= 0.084 acres
Pervious Area:	6,357 sq. ft. / 43560 sq. ft. / acre	= 0.146 acres

Runoff Coefficient (weighted):

0.0836 acres	x 0.95 =	0.0794 acres		
0.1459 acres	x 0.35 =	0.0511 acres		
0.230 acres		**0.131 acres**	**/ 0.230 acres**	**= 0.570**

VOLUME AND FLOW:

Q_{25} pre =	0.348 x	5.91 x	0.230 =	0.473 cfs	
Q_{25} post =	0.570 x	5.91 x	0.230 =	0.775 cfs	
V_{25} pre =	0.493 x	0.473 x	0.230 =	0.054 ac-ft	
V_{25} post =	0.493 x	0.775 x	0.230 =	0.088 ac-ft	
Q_{100} pre =	0.348 x	8.78 x	0.230 =	0.703 cfs	
Q_{100} post =	0.570 x	8.78 x	0.230 =	1.151 cfs	
V_{100} pre =	0.732 x	0.703 x	0.230 =	0.118 ac-ft	
V_{100} post =	0.732 x	1.151 x	0.230 =	0.194 ac-ft	

V_{100} post -	V_{100} pre =	0.194 ac-ft	- 0.118 ac-ft		**= 0.076 ac-ft**
0.076 ac-ft x	43560 sq. ft. / acre		= 3310.56 cu-ft	x 7.48 gal/cf	**= 24,763 gal**
Q_{100} post -	Q_{100} pre =	1.151 cfs	- 0.703 cfs =	0.448 cfs	
0.448 cfs x	60 sec/min	x 45 min	= 1209.60 cfm	x 7.48 gal/cf	**= 9,048 gpm**

END GALLEY STORAGE:

Design Infiltration Rate: 7 min/inch = 0.71 ft/hr Rawls Ratio: 8.27 (Sand)

Infiltration Capacity

Bottom Area =	8.0'	x 6.0'	= 48.0 sq. ft.	
48.0 sq. ft.	x 0.71 ft/hr	= 34.1 cfh	= 818.4 cf/day	= 0.0188 ac-ft

Galley Storage

Total =	48.0 sq. ft.	x 3.25'	= 156.0 cf	
Embedded Galley Volume =	4.00'	x 4.00'	x 3.25'	= 52.0 cf
Stone Volume =	156.0 cf	- 52.0 cf	= 104.0 cf	
Storage =	stone volume x voids ratio		= 104.0 x 0.35	= 36.4 cf
Galley Volume =	3.50'	x 3.50'	x 3.25'	= 39.8 cf

Total Capacity = Galley Volume + stone void volume

39.8 + 36.4 = 76.2 cf = 0.0017 ac-ft

Total stored/infiltrated = infiltration capacity + total capacity

0.0188 ac-ft + 0.0017 ac-ft **= 0.0205 ac-ft**

MIDDLE GALLEYS STORAGE:

Design Infiltration Rate: 7 min/inch = 0.71 ft/hr Rawls Ratio: 8.27 (Sand)

Infiltration Capacity

Bottom Area =	8.0'	x 4.0'	= 32.0 sq. ft.	
32.0 sq. ft.	x 0.71 ft/hr	= 22.7 cf/hr	= 544.8 cf/day	= 0.0125 ac-ft

Galley Storage

Total =	32.0 sq. ft.	x 3.25'	= 104.0 cf	
Embedded Galley Volume =	4.00'	x 4.00'	x 3.25'	= 52.0 cf
Stone Volume =	104.0 cf	- 52.0 cf	= 52.0 cf	
Storage =	stone volume x voids ratio		= 52.0 x 0.3	= 15.6 cf
Galley Volume =	3.50'	x 3.50'	x 3.25'	= 39.8 cf

Total Capacity = Galley Volume + stone void volume

52.0 + 15.6 = 67.6 cf = 0.0016 ac-ft

Total stored/infiltrated = infiltration capacity + total capacity

0.0125 ac-ft + 0.0016 ac-ft **= 0.0141 ac-ft**

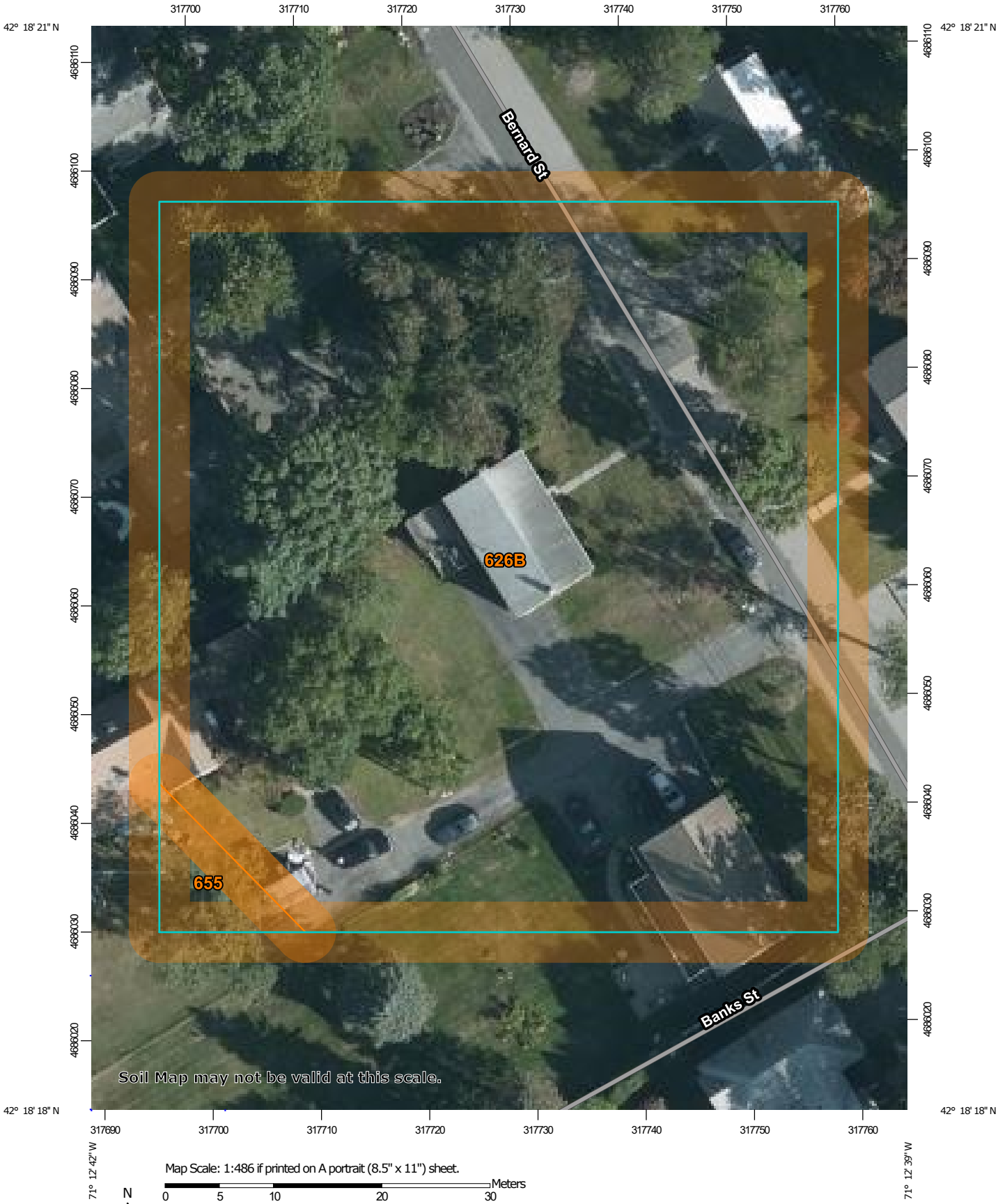
REQUIRED SYSTEM STORAGE:

Storage required: **0.0760 ac-ft**

Storage provided:

Unit Type	Qty.	Unit Capacity	Total		
End:	2	0.0205 ac-ft	0.0410 ac-ft		
Middle:	6	0.0141 ac-ft	0.0846 ac-ft		
Low Profile End:	0	0.0056 ac-ft	0.0000 ac-ft		
Low Profile Middle:	0	0.0038 ac-ft	0.0000 ac-ft		
Total =	**8 units**		**0.1256 ac-ft**	>	0.0760 ac-ft

Therefore OK



Map Scale: 1:486 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	1.0	97.8%
655	Udorthents, wet substratum	0.0	2.2%
Totals for Area of Interest		**1.0**	**100.0%**

Middlesex County, Massachusetts

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Dunes, outwash terraces, deltas, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex

Across-slope shape: Convex, linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

Middlesex County, Massachusetts

655—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: vr1n
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, wet substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land

Percent of map unit: 8 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Freetown

Percent of map unit: 4 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Bogs, depressions

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

OPERATION AND MAINTENANCE PLAN
25 BERNARD STREET
NEWTON, MASSACHUSETTS

OPERATION & MAINTENANCE PLAN

The stormwater runoff controls associated with this project will require continued maintenance by the property owner. The major components associated with maintenance needs are the drain manhole, trench drain, and infiltration system. These will need to be cleaned periodically as noted below. Cleaning of these structures shall be done by the developer & property owners via a specialty contractor with hydraulic cleaning ability. In addition to the facilities noted below, the property owner should maintain any roof gutters/drains on a regular basis to prevent clogging and carry over of debris into the driveway system. The property owner should also provide for the periodic cleaning of the driveway areas to remove large debris, grass cuttings and sand particles prior to discharge through the catch basin units. The following outlines the major maintenance issues associated with the project.

Drain Manhole with Sump Cleaning:

The Drain Manhole structure should be inspected after completion of construction to assure that all debris was removed and no construction material will be cause the system to clog. This inspection should also include the drain lines within the system.

The drain manhole sump should be inspect quarterly; if depth of sediment in sump exceeds 50% capacity, sediment must be removed. The drain manhole should be cleaned with a hydraulic vacuum system two (2) times per year (spring and fall season) to remove accumulated solids and debris. At the same time, the drain lines should be inspected and cleaned if needed. Assuming the drain manhole and drain lines are maintained and cleaning is in accordance with normal standards, the solids removal efficiency should be as required to prevent carry over of large solids to the infiltration systems.

Trench/Area Drain Cleaning:

The trench drain structure should be inspected after completion of construction to assure that all debris was removed and no construction material will be cause the system to clog. This inspection should also include the drain manholes & drain lines within the system.

The trench drain should be cleaned once per year to remove accumulated solids and debris. At the same time, the drain manholes & lines should be inspected and cleaned if needed. Assuming the trench drain and the drain manholes & lines are maintained and cleaning is in accordance with normal standards, the solids removal efficiency should be as required to prevent carry over of large solids to the infiltration systems.

Storage / Infiltration System:

The storage/infiltration system should be inspected after completion of construction to assure that all debris was removed and no construction material will be cause the system to clog.

The storage/infiltration system should be inspected over the first year of operation on a quarterly basis to determine the level of required maintenance. This inspection should be performed by the Owner's Engineer and a report issued to the City as to any cleaning / maintenance needs of that system. At the same time, the inspection of the catch basins and piping should be performed to determine any flushing / cleaning needs. As a preliminary schedule, the system piping should be cleaned once a year to remove accumulated sediments and sediments in the infiltration chambers should be removed when they reach two (2) inches in depth.

Maintenance Responsibilities:

The maintenance of the Drainage System is the responsibility of the Property Owner(s), via their owners association. The actual work should be subcontracted to a company that specializes in the cleaning of storm drainage facilities. Inspections should be performed by independent individual such as the design engineer or other experienced individual in the field.

OPERATION & MAINTENANCE PLAN INSPECTION REPORT
25 BERNARD STREET, NEWTON, MASSACHUSETTS

Inspection Firm: _____

Inspector's Name:_____Date: _____

Components Inspected: _____

_____

Signed: _____

System Manintenance:

Maintenance Firm: _____Date: _____

Trench Drain Cleaned: Yes: [ ] No: [ ] Comments: _____

_____

_____

Drain Lines Inspected: Yes: [ ] No: [ ] Comments:_____

_____

_____

Infiltration Systems(s) Cleaned: Yes: [ ] No: [ ] Comments: _____

_____

_____

Estimate of Material Removed::_____

Other Comments: _____

_____

Signed: _____