

FEASIBILITY REPORT

STRUCTURAL SURVEY AND FEASIBILITY STUDY PROPOSAL FOR
THE EXISTING HOUSE AT HORSESHOE FARM PARK : RALEIGH, NC



CLIENT:

CITY OF RALEIGH
Parks and Recreation Department
Municipal Building
222 West Hargett Street
Raleigh, NC 27601
919-996-3285 tel

DESIGN TEAM:

LAPPAS + HAVENER, PA
Eric Davis ASLA, LEED AP
The Imperial Building
215 Morris St, Site 150
Durham, NC 27701
(919) 419-1199 tel

FRANK HARMON ARCHITECT, PA
Frank Harmon, FAIA - Mike Spinello, Assoc. AIA
706 Mountford Ave.
Raleigh, NC 27603
919 829 9464 tel

CONTENTS 00

introduction	01
structural report	05
building assessment	11
cost opinion	29
appendix	37

INTRODUCTION

Horseshoe Farm Park Education Center

01

Dear City of Raleigh,

We are pleased to provide you with a feasibility report documenting our services for the Horseshoe Farm Park Feasibility Study. In early summer, our design team, consisting of architects, landscape architects, structural engineers, and specialists conducted a survey of the site and existing farmhouse.

Included in this feasibility report are results from the structural survey, basic review of ADA, building code, hazmat issues (including lead paint and asbestos) potable water septic issues, state historic property classification, LEED strategies, and preliminary cost opinions. The design concept is not a final representation but is intended to provide a suggestion for how the existing farmhouse, site, and new construction could be utilized to meet the goals and vision of the City of Raleigh.

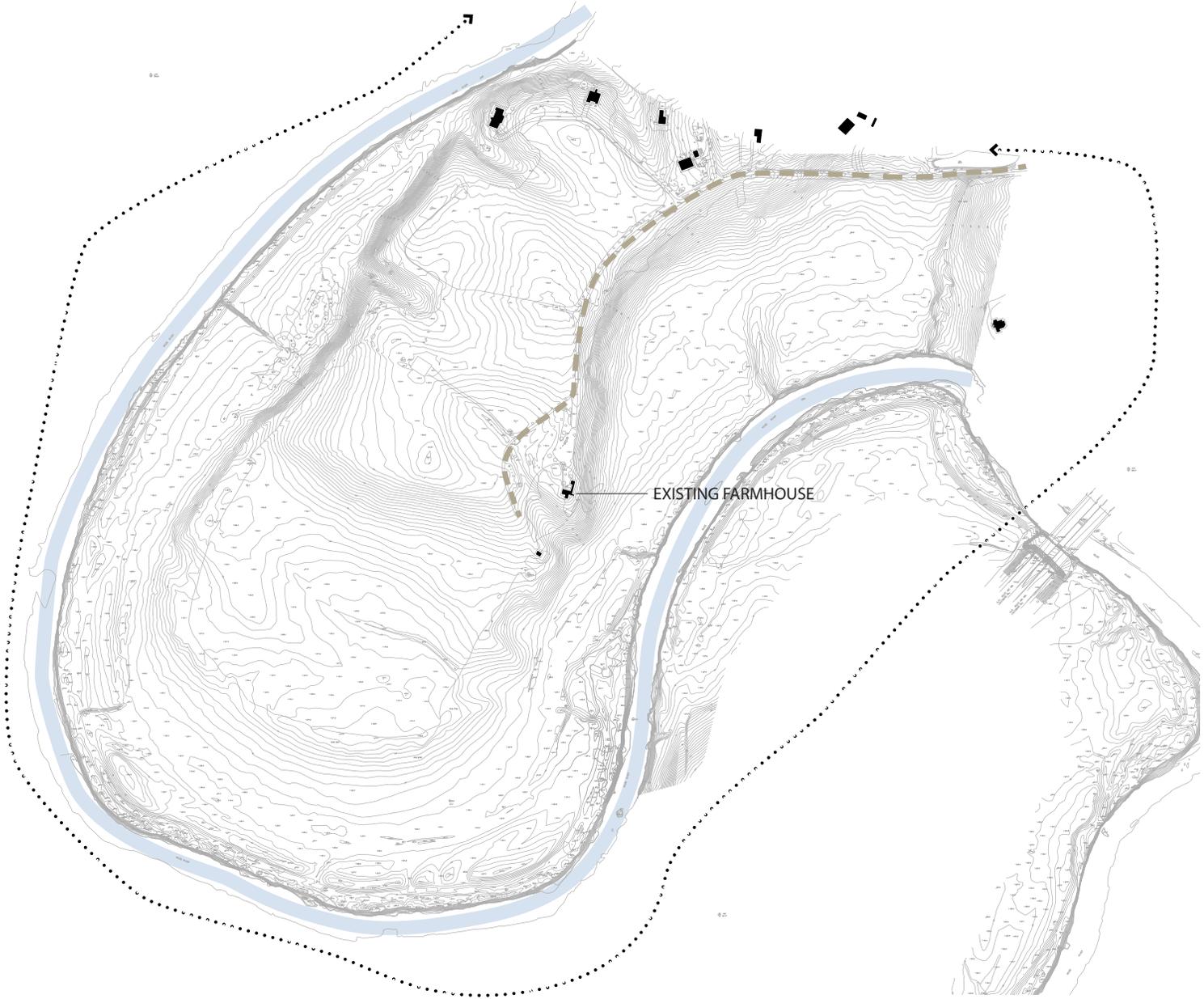
Sincerely,

A handwritten signature in black ink that reads "Frank Harmon". The signature is written in a cursive style with a long, sweeping horizontal line extending to the right.

Frank Harmon, FAIA



HORSESHOE FARM SITE PLAN



PRELIMINARY CONDITION ASSESSMENT OF EXISTING FARMHOUSE RALEIGH, NC

Prepared by:
Charles E. Murphy, P.E.
SGI Engineering
200 North Greensboro St, Suite B13A
Carrboro, NC 27510
February 8, 2011

A limited structural review of the farmhouse at Horseshoe Farm Park was made in support of planning and development of Horseshoe Farm Park. The site is located on a 146 acre oxbow of the Neuse River in North Raleigh. The review was limited to a visual survey of the building and a preliminary assessment of the identified framing. The review is preliminary in scope and is intended to identify structural deterioration, limitations and deficiencies. No testing of materials of construction was undertaken.

The farmhouse consists of an original single story, two room tenant dwelling with subsequent additions to the front, sides, and rear. The original construction was estimated by the North Carolina Historic Preservation Office to date from 1920 or earlier. The additions consist of a front porch, an addition to the right side (bathroom flanked by two small rooms), two additions to the rear (kitchen and laundry), and a two story addition to the left side connected to the original structure by sitting room.

The original house construction consists of rough sawn framing and brick foundation piers. The crawlspace is enclosed by CMU infill of more recent construction. The additions are framed with surfaced dimensional lumber except for the kitchen, which is framed with rough sawn lumber. The foundations of the additions consist of continuous CMU foundation walls except for the front porch, which is brick piers and open.

The house footprint and partial floor and roof framing are shown on the attached sketch.

The crawlspace under the original portion of the house was congested with ductwork and temporary shoring. Due to access limitations the front and right sides of the crawlspace were not reviewed. No deterioration was noted in the floor framing that was reviewed. However, possible water damage at the front sill has previously been reported. Deterioration was noted at the roof fascia but appears to be limited.

In general, the construction was found to be sound but of marginal quality compared to modern building standards. Based upon reasonable assumptions regarding the grade of the rough sawn lumber, the allowable floor live load capacity of the original construction is limited by the interior girder to 20 psf. The floor joists capacities vary and are given below:

<i>Floor Joist Allowable Live Load (estimated)</i>	
2x8 RS @ original construction	36 psf
2x8 RS @ kitchen addition	65 psf
2x6 @ laundry addition	37 psf
2x8 @ sitting room	45 psf

In the original construction, the ceiling joists span from front to rear and break over an interior wall on the right side of the chimney. At the left side of the chimney, a round timber beam spanning approximately 12.5 feet supports the ceiling joists. This construction is overstressed under the ceiling self weight and is inadequate.

The gable roof over the original construction is framed with rough sawn 2x4 rafters, no ridge member, and 1x skip sheathing. Although the rafters are of marginally acceptable strength and the construction appears to free of distress, the skip sheathing does not provide adequate diaphragm action to resist lateral loads accumulated in the roof plane.



1 ROUGH SAWN FRAMING + BRICK PIER



2 CMU INFILL BETWEEN BRICK PIERS



3 ROUGH SAWN FRAMING AT KITCHEN



4 NEWER CMU FOUNDATION WALLS



5 OPEN BRICK PIERS



6 CONGESTED DUCK WORK + TEMPORARY SHORING



7 DETERIORATION AT ROOF FASCIA



8 CEILING JOIST RUNNING FRONT TO REAR

The front porch is lightly framed with an estimated floor live load capacity of 27 psf. The porch roof rafters are toenailed to the main roof fascia board. This construction is inadequate but appears to be free of distress.

The two story addition on the left side and the connecting sitting room are of more recent construction. The gable roof of this construction is framed with metal plate connected wood trusses. However, the roof is skip sheathed with 1x4 spaced at 24 inches. While the roof framing is likely adequate the skip sheathing is not.

Based upon this preliminary review, it is evident that structural upgrades of the floor framing and roof will be required if the farmhouse is utilized as part of the park facility. Depending upon the end use, floor live load requirements will range from 50 psf (office/class room) to 100 psf (assembly). Structural upgrades would entail reinforcing the floor framing, adding structural sheathing to the roof, reworking the porch roof rafter connection, and replacing the round timber girder supporting the ceiling joists.

Summary

If the farmhouse is to be retained, the following structural work will likely be needed:

1. remove all temporary shoring in crawlspace
2. add intermediate piers at girders
3. add intermediate drop girders @ joist spans or sister joists to increase LL capacity
4. add structural sheathing to roof
5. replace round timber header @ ceiling with structural girder
6. misc repairs @ sill, fascia, window opening

Cost Estimation

foundation work (piers)	\$16,000
install drop girders/sister joists	\$8,000
sheath roof	\$5,000
ceiling girder	\$1,500
misc repair	\$5,000
total	\$35,500 for structural renovation => budget \$50,000

This work suggests the following scope of work (wholesale renovation):

1. replace HVAC ducts, etc
2. seal crawlspace
3. new roofing
4. new windows
5. new wiring & electrical service



9 ROUND TIMBER BEAM



10 1X SKIP SHEATHING + NO RIDGE BEAM



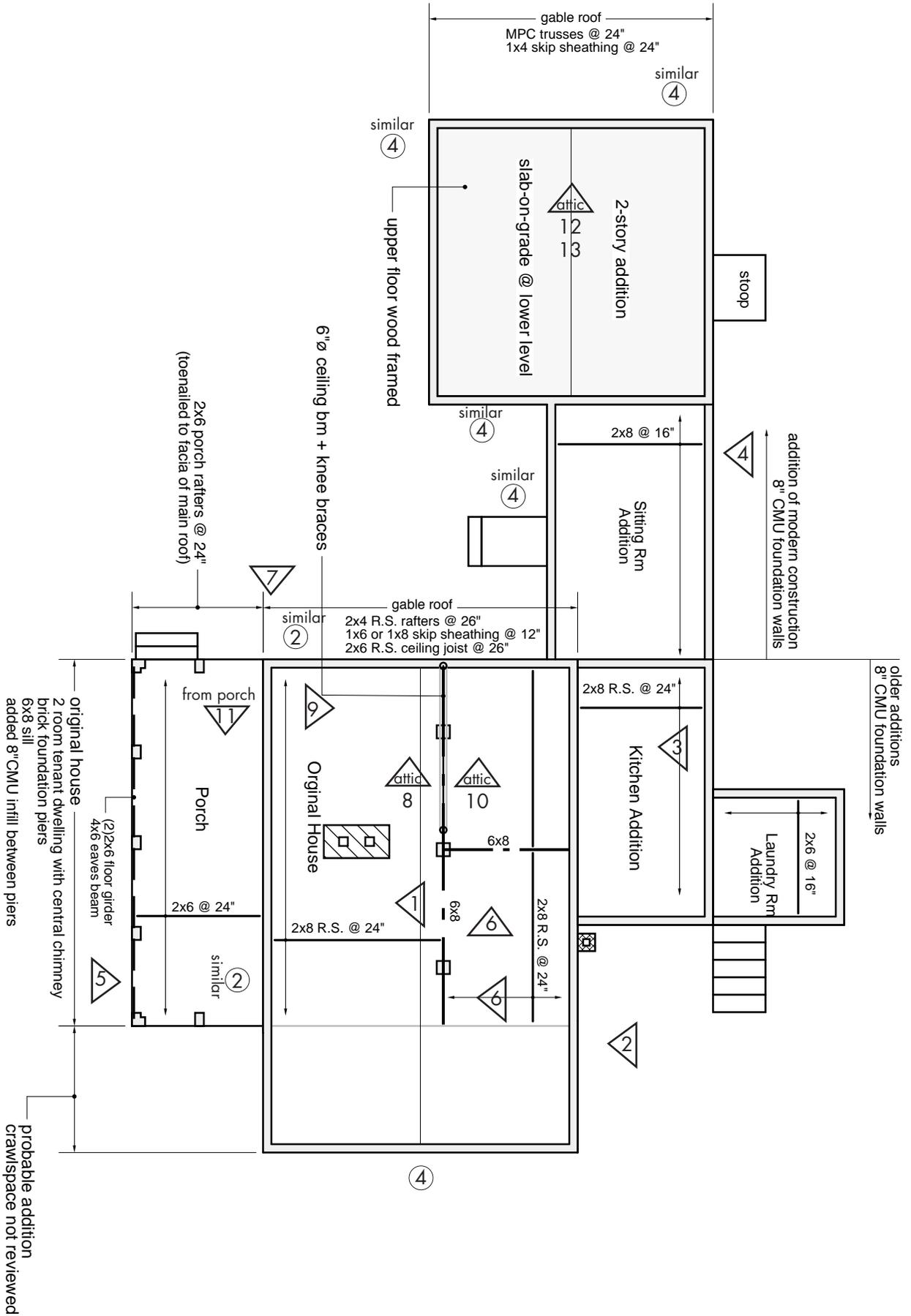
11 TOENAILED PORCH RAFTERS



12 METAL PLATE CONNECTED ROOF TRUSSES



13 1X4 SKIP SHEATHING SPACED AT 24 INCHES





The following is a limited assessment of the farm house at Horseshoe Farm Park and is made in support of planning and development of Horseshoe Farm Park. The assessment is preliminary in scope and is intended to identify features of the property that offer potential challenges or opportunities for the restoration of the property.

1. Americans with Disabilities Act (ADA):

The existing farm house is not ADA accessible. See attached Accessible Needs Plan. New construction for accessibility includes (1) ramp, (1) renovated ADA bathroom, (1) new ADA bathroom, (9) accessible doors, (1) ADA parking space and (1) accessible path.

2. Building Code Review per 2009 North Carolina State Building Code:

Existing construction is type 5B; no fire-resistance rating for floors, walls, partitions, ceiling or roof.

Building occupancy: We have assumed A3 Assembly Occupancy as the most restrictive use for the farm house. This occupancy includes uses such as a gallery, lecture space, or museum. For type 5B construction A3 occupancy allows up to 6,000 s.f., which is greater than the 1,000 s.f. of the farm house (minus bedroom annex addition). A3 occupancy also allows mixed used including education (Classroom) or offices (Business). Fire protection (sprinklers) are not required.

3. Hazardous Materials Abatement:

Hazardous materials include asbestos and lead paint. An estimate for asbestos and lead paint abatement was prepared by Empuricon on 2.15.11. See appendix for detailed reports.

All windows and doors are to be replaced with new windows and doors, thus eliminating lead paint on these items. Our estimate includes complete asbestos abatement and lead paint abatement on the exterior. Any remaining lead paint on the interior can be encapsulated.

4. Existing Well and Septic System:

The Existing well system has not been tested for water quality or flow rate, and the condition of the existing septic field is unknown. See Infrastructure Feasibility Report by Mulkey Engineers.

For the purpose of this report, we have assumed a new well and septic system if the City of Raleigh chooses to retain the existing farm house.

5. State Historic Preservation Office (SHPO):

The existing house and barn are not listed in the National Register of Historic Places. See appendix for correspondence with SHPO.

6. Farm House Renovation/Removal strategies:

The existing farm house is well sited on a bluff overlooking an expansive meadow and the Neuse River. Like many buildings of its period, the farm house has good orientation for sunlight and daylight, cross ventilation, and good tree cover of deciduous and evergreen trees for shading.

If the farm house is retained, we think that the most valuable structure is the original house with bathroom and kitchen, and that the later 2-story bedroom annex could be removed as a non-contributing structure.

After our survey and analysis, and subsequent discussion with City of Raleigh Parks and Recreation staff, we propose four strategies for renovation or removal:

A. Stand Alone Farm House

Possible uses for the building include a gallery, park offices or small classroom use.

Building would serve as an example of sustainable re-use. Renovations include:

1. Remove 2-story bedroom annex.
2. Upgrade building for ADA accessibility.
3. Upgrade building to meet current environmental and energy-use standards.
4. Renovate Building.



5. New well and septic system.

See Opinion of Construction Cost for detailed analysis of renovation.

B. Stand alone Farm House Programatically Connected to Adjacent Education and Arts Center

Farm house could be utilized for offices, classroom, meeting rooms, gallery, reception spaces, etc. programatically connected to the adjacent center. The new center would reflect elements of the form, scale, and materials of the existing farm house, thus creating historic continuity on the site. Renovations include:

1. Remove 2-story bedroom annex.
2. Upgrade building for ADA accessibility.
3. Upgrade building to meet current environmental and energy use standards.
4. Renovate building.
5. Farm house to use well and environmental septic system constructed for new Center.

See Opinion of Construction Cost for detailed analysis of renovation.

C. Demolish and Remove Existing Farm House

Building materials to be recycled or disposed of legally.

Hazardous abatement required.

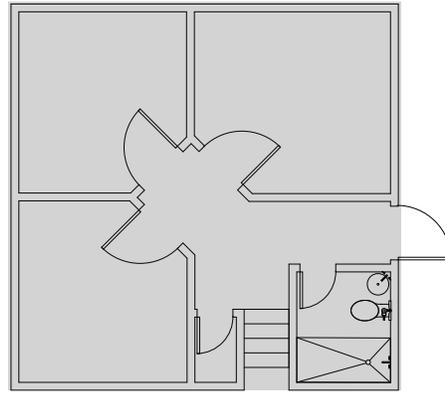
D. Restore Existing Farm House to a Point to Reduce Continued Degradation.

Renovations include:

1. Stabilize foundation.
2. Miscellaneous structural repairs.
3. Ceiling girder.
4. New roof and roof sheathing.

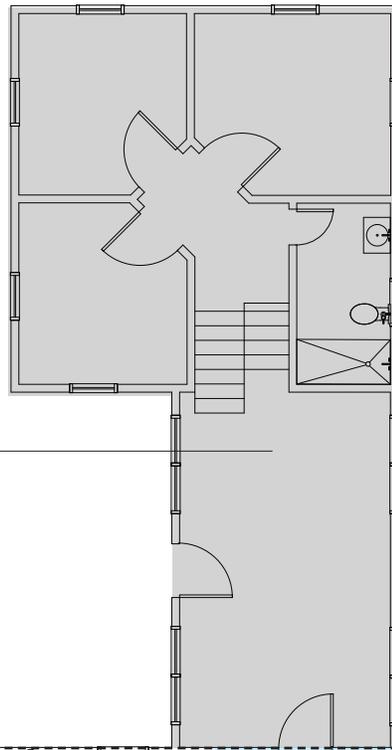
See Opinion of Construction Cost for detailed analysis of stabilization.

EXISTING FARMHOUSE



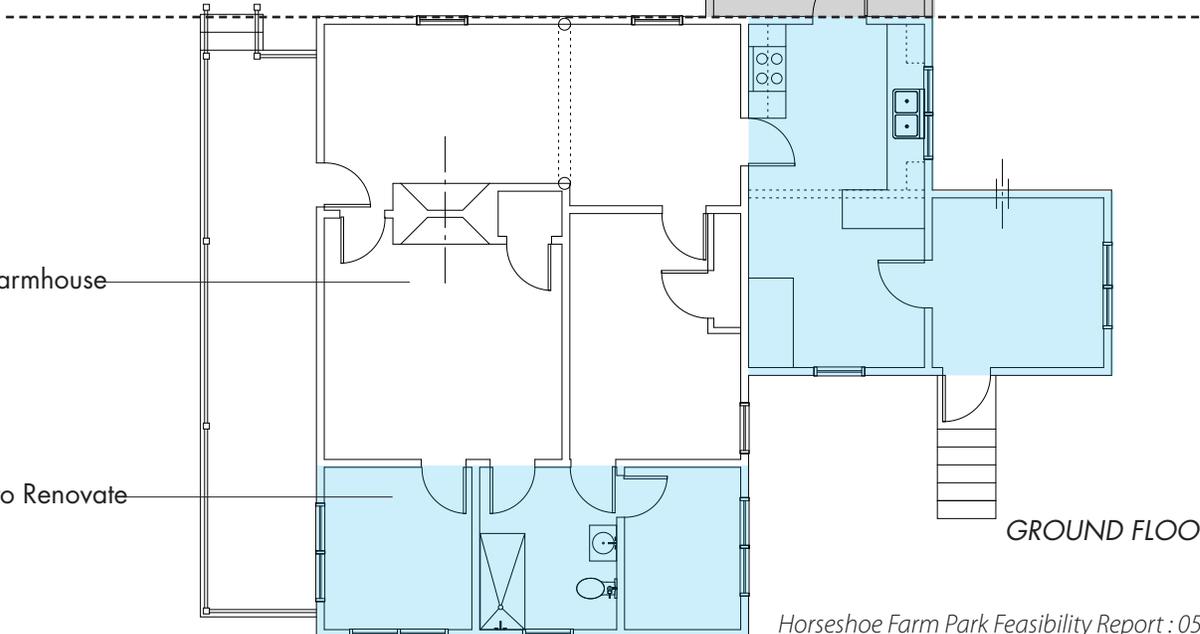
BASEMENT PLAN

Bedroom Annex



Original Farmhouse

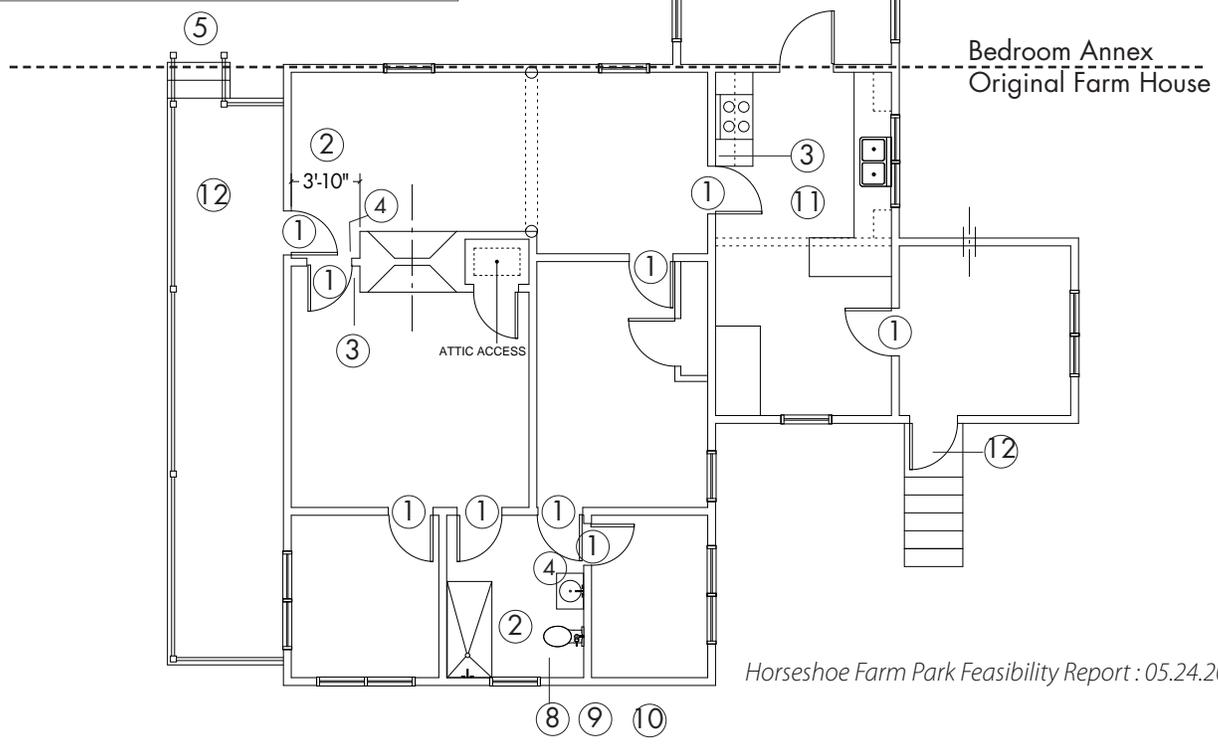
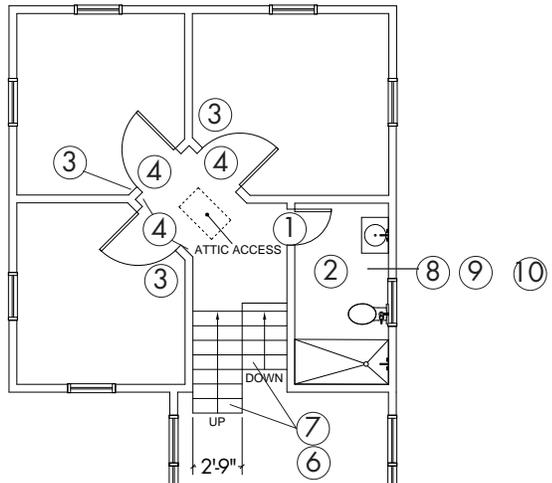
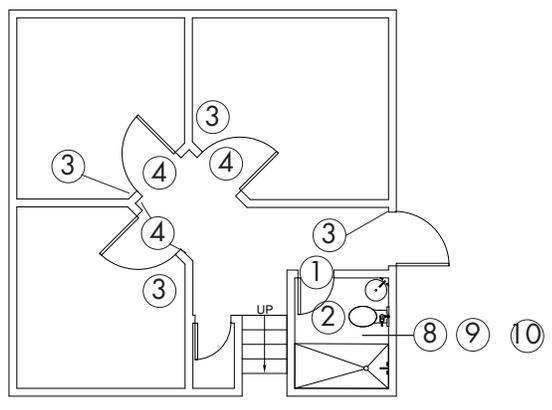
Additions to Renovate



GROUND FLOOR PLAN

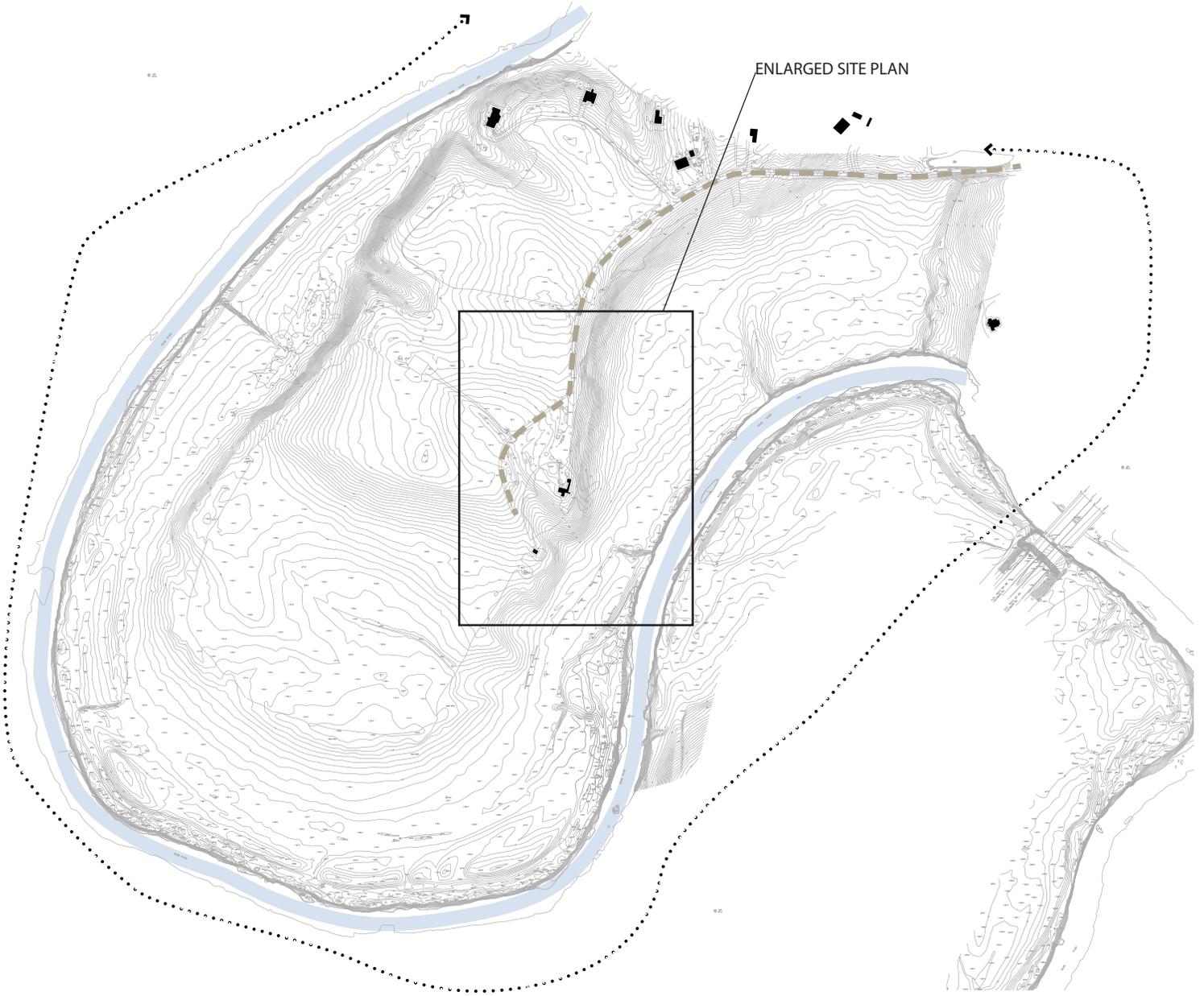
Accessible Needs Plan

- KEY**
- ① 32" min. clear opening (36" door) required (ANSI 404.2.2)
 - ② 60" min clearance required (ANSI 404.2.3)
 - ③ 18" min clearance: pull side of door (ANSI 404.2.3)
 - ④ 12" min clearance: approach side of door (ANSI 404.2.3)
 - ⑤ Accessible access ramp required
 - ⑥ Exceeds max allowable riser height (7") (NCSBC 1009 + ANSI 504)
 - ⑦ Minimum allowable stair width (NCSBC 1009)
 - 44" if occupant load > 50
 - 36" if occupant load < 50
 - ⑧ Location of bathroom fixtures does not meet requirements
 - ANSI 604 for wash closet
 - ANSI 606 for lavatories
 - ⑨ Accessible grab bars required (ANSI 604.5)
 - ⑩ Water closet seat height required to be 17-19" (ANSI 604.4)
 - ⑪ Accessible kitchen (ANSI 804) shall provide: (does not meet requirements)
 - workspace 34" max aff.
 - knee + toe clearance
 - sink
 - 50% shelf space in cabinets
 - ⑫ (1) exit required if occupant load < 49 (Business Occupancy)
 (2) exits required if occupant load > 49 (Assembly Occupancy)

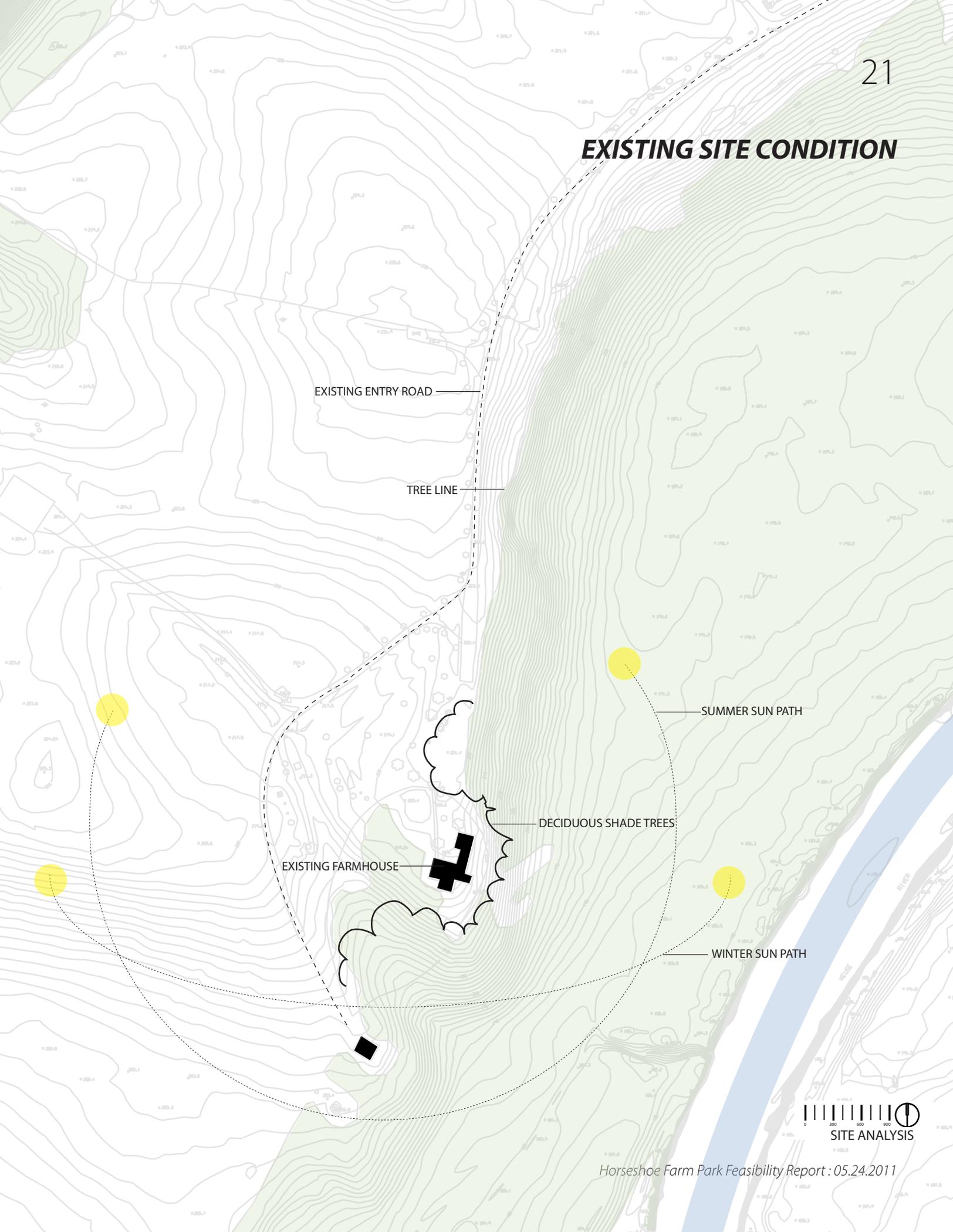




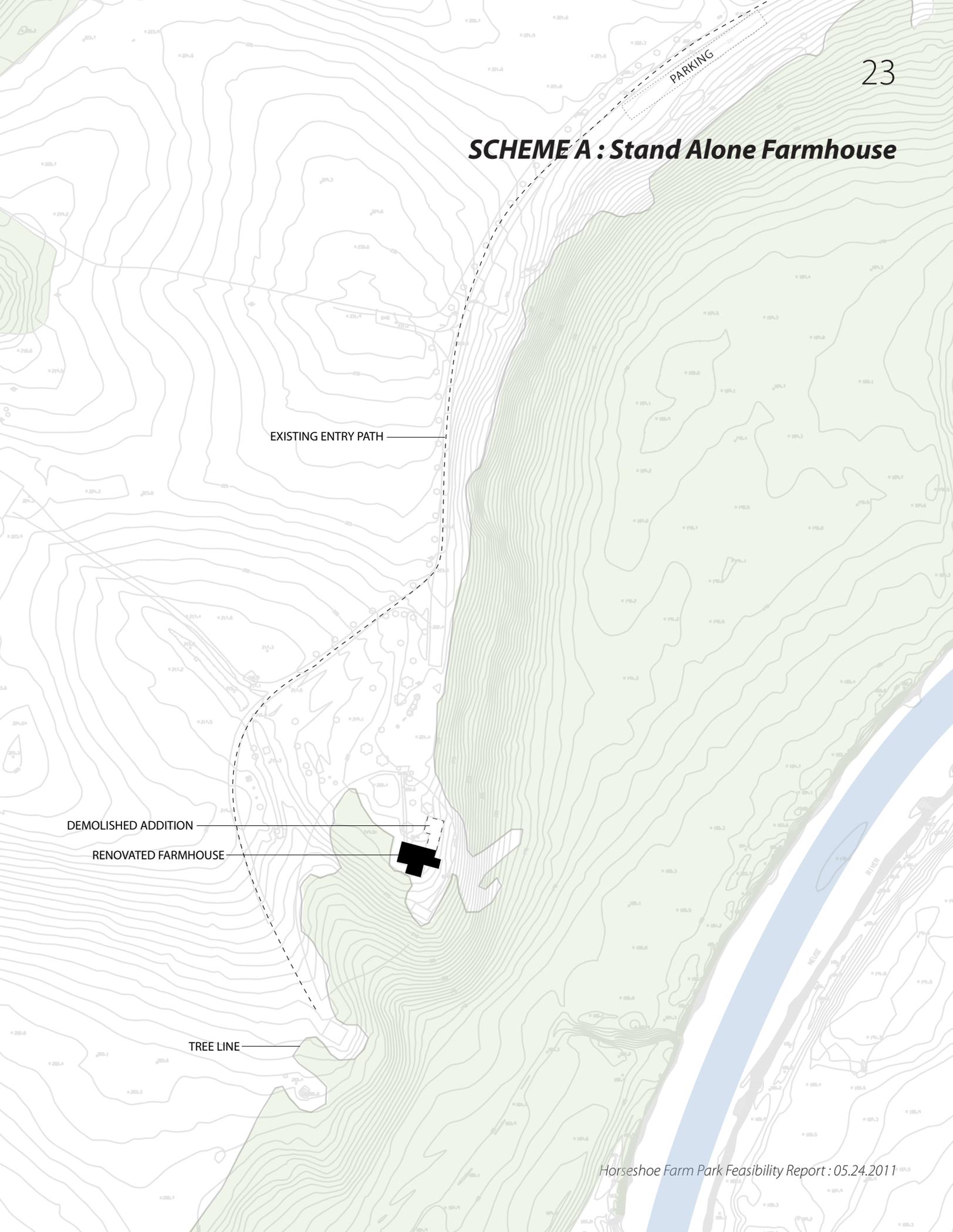
HORSESHOE FARM SITE PLAN



EXISTING SITE CONDITION



SCHEME A : Stand Alone Farmhouse

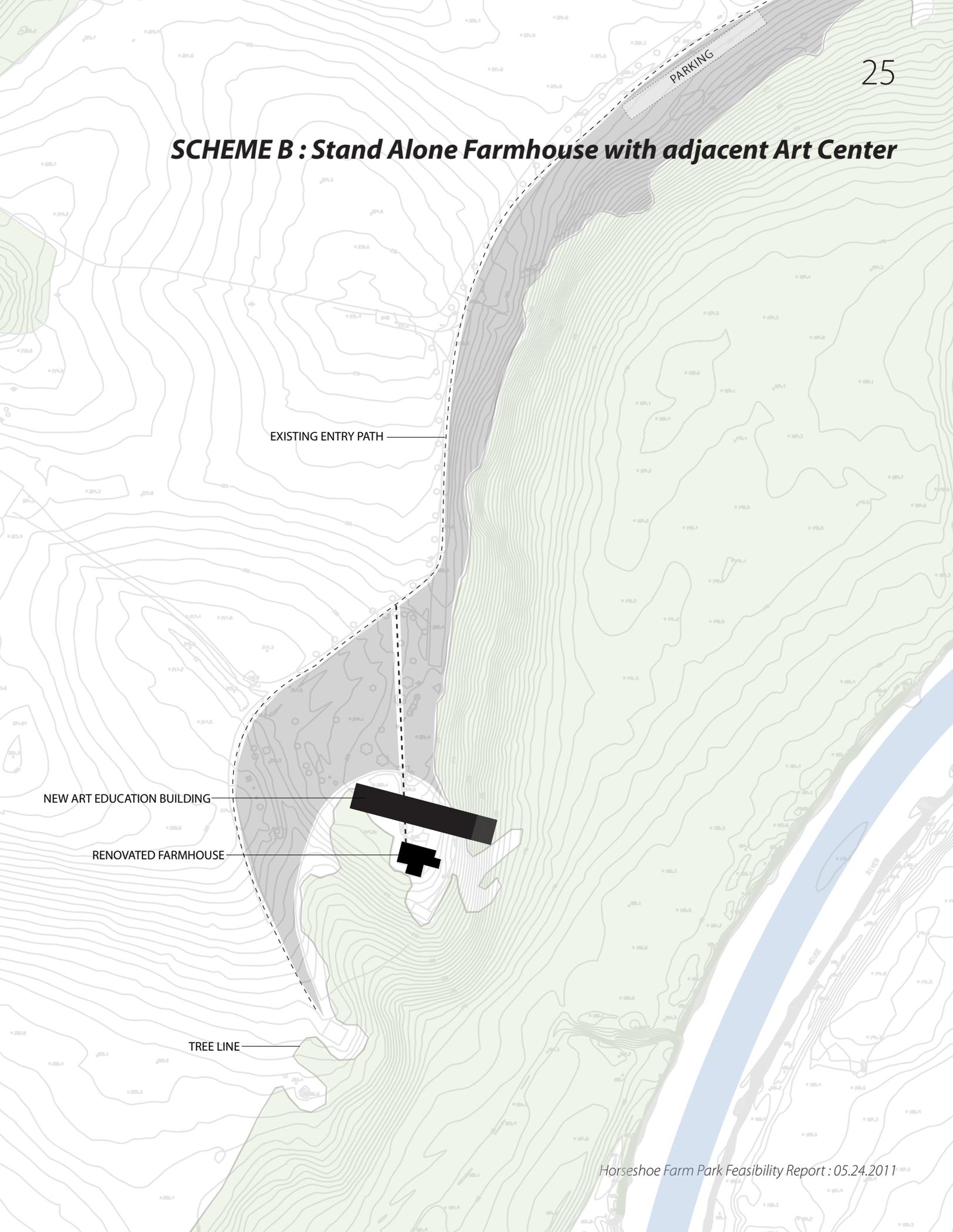


DEMOLISHED ADDITION

RENOVATED FARMHOUSE

TREE LINE

SCHEME B : Stand Alone Farmhouse with adjacent Art Center



EXISTING ENTRY PATH

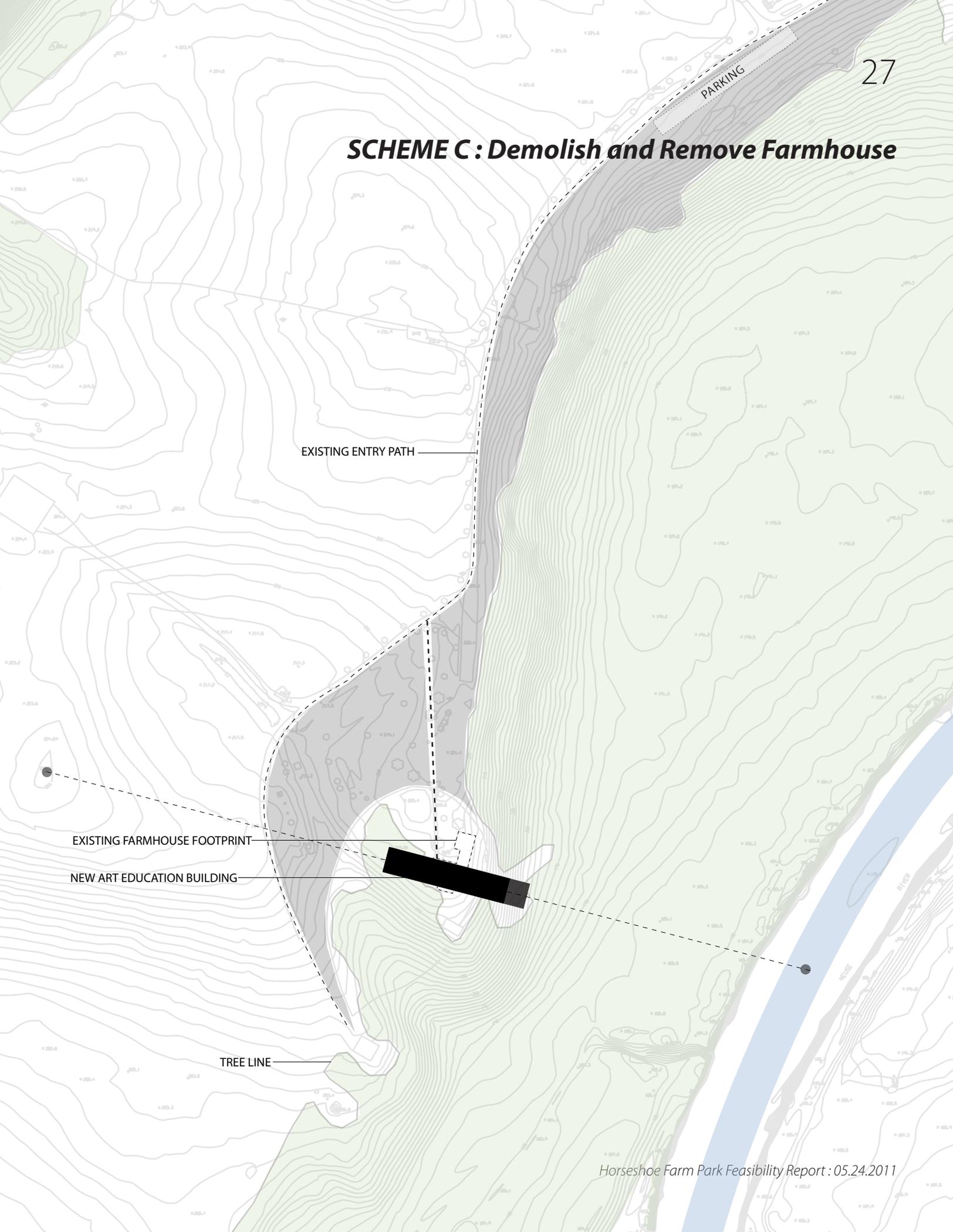
NEW ART EDUCATION BUILDING

RENOVATED FARMHOUSE

TREE LINE

PARKING

SCHEME C : Demolish and Remove Farmhouse



PARKING

EXISTING ENTRY PATH

EXISTING FARMHOUSE FOOTPRINT

NEW ART EDUCATION BUILDING

TREE LINE

Horseshoe Farm Park - Existing Farm House

Preliminary Opinion of Construction Costs - 05.24.11

A. Stand Alone Farm House

To be used as a park office, gallery or small classroom facility

1	Demolition of 2 story addition and recycle materials	\$7,000.00
2	Hazardous Material Abatement	
	a. Asbestos	\$4,230.00
	b. Lead Paint	
	1. Abate loose + flaking paint exterior only	\$23,100.00
	2. Full abatement of lead paint (\$49,300)	
3	Structural Upgrade	\$35,500.00
	Includes increasing floor structure to 100 psf capacity for Assembly Occupancy (see Structural Report)	
4	Crawlspace	\$2,500.00
	Raise crawlspace to 3'-0" clearance (included in Structural Upgrade) and seal	
5	Roofing	\$9,000.00
	Tear off and legally dispose of existing roofing. Install 15# building felt and new 3-tab shingles with flashing over new sheathing (new sheathing is included in Structural Upgrade)	
6	Insulation	\$8,000.00
	Install new wall, floor and roof insulation. Use batt insulation where possible, use spray-in foam insulation (icynene) in inaccessible spaces	
7	Windows and Doors	\$8,500.00
	a. Remove existing windows and replace with wood windows (clad) to match existing	
	b. Install (9) new accessible doors	
8	Plumbing	
	a. Renovate existing bathroom to meet ADA requirements	\$3,600.00
	b. Create new second bathroom, ADA accessible	\$6,400.00
	c. New plumbing drains to septic field, new hot and cold water supply	\$4,600.00
9	Well	\$10,000.00
	Assume new well to replace existing, see Mulkey Infrastructure Report	
10	Septic	
	Assume new septic system to replace existing	
	a. For Office Occupancy: 25 gallon/day/employee	\$7,500.00
	b. For Public Occupancy: 500 gallon/day (\$15,000)	

11	Electric	\$7,500.00
	Remove existing wiring, switches, fixtures and panel. Assume existing power service to remain. Install new panel, wiring, switches, receptacles as required. Includes smoke alarms.	
12	HVAC	\$11,800.00
	Remove existing ductwork and heat pump. Install new HVAC system including high efficiency air-to-air heat pump, new ductwork, registers, grills, and controls.	
13	Interior Finishes	
	Patch interior finishes where required by deteriorated condition, or from installation of plumbing, mechanical or electrical systems (allowance)	\$2,400.00
14	Renovate Kitchen	\$4,000.00
	New appliances	
15	Accessible Ramps (2)	\$3,000.00
16	Painting	
	a. Exterior (includes minor repairs to wood siding and trim, installed after abatement is complete. Includes miscellaneous sealants.	\$6,500.00
	b. Interior (includes miscellaneous sealants)	\$3,500.00
17	Floor Finishes	
	Allow \$400/s.f. for carpet and resilient tile	\$4,000.00
18	Accessible Paths	
	Allowance	\$3,500.00
19	Handicapped Parking Space	\$2,500.00
Total Stand Alone Farm House:		\$178,630.00

B. Stand Alone Farm House**Programmatically connected to adjacent Education and Arts Center**

1	Demolition of 2 story addition and recycle materials	\$7,000.00
2	Hazardous Material Abatement	
	a. Asbestos	\$4,230.00
	b. Lead Paint	
	1. Abate loose + flaking paint only	\$23,100.00
	2. Full abatement of lead paint (\$49,300.00)	
3	Structural Upgrade	\$35,500.00
	Includes increasing floor structure to 100 psf capacity for Assembly Occupancy (see Structural Report)	
4	Crawlspace	\$2,500.00
	Raise crawlspace to 3'-0" clearance (included in structural upgrade) and seal	
5	Roofing	\$9,000.00
	Tear off and legally dispose of existing roofing. Install 15# building felt and new 3-tab shingles with flashing over new sheathing (new sheathing is included in Structural Upgrade)	
6	Insulation	\$8,000.00
	Install new wall, floor and roof insulation. Use batt insulation where possible use spray-in foam insulation (icynene) in inaccessible spaces	
7	Windows and Doors	\$8,500.00
	a. Remove existing windows and replace with wood windows (clad) to match existing	
	b. Install (9) new accessible doors	
8	Plumbing	
	a. Renovate existing bathroom to meet ADA requirements	\$3,600.00
	b. Create new second bathroom, ADA accessible	\$6,400.00
	c. New plumbing drains to septic field, new hot and cold water supply	\$4,600.00
9	Well	---
	Use water supply from new Education and Arts Center	
10	Septic	---
	Use septic system for new Education and Arts Center	
11	Electric	\$7,500.00
	Assume existing power service to remain. Install new panel, wiring, switches, receptacles as required. Includes smoke alarms.	
12	HVAC	\$11,800.00
	Remove existing ductwork and heat pump. Install new HVAC system including high efficiency air-to-air heat pump, new ductwork, registers, grills, and controls.	

13 Interior Finishes		
	Patch interior finishes where required by deteriorated condition, or from installation of plumbing, mechanical or electrical systems	\$2,400.00
14 Renovate Kitchen		\$4,000.00
	New appliances	
15 Accessible Ramps (2)		\$3,000.00
16 Painting		
	a. Exterior (includes minor repairs to wood siding and trim, installed after abatement is complete. Includes miscellaneous sealants.	\$6,500.00
	b. Interior (includes miscellaneous sealants)	\$3,500.00
17 Floor Finishes		
	Allow \$400/s.f. for carpet and resilient tile	\$4,000.00
18 Accessible Paths		
	Allowance	\$3,500.00
19 Handicapped Parking Space		
	Use handicapped spaces at Center	---
Total Stand Alone Farm House		\$158,630.00
Programmatically Connected to Adjacent Education and Arts Center:		

C. Demolish Existing Farm House

	Recycle materials, including hazardous materials abatement (see Empuricon report)	\$17,900.00
Total Demolish Existing Farm House:		\$17,900.00

D. Restore Existing Farm House

To a point to reduce continued degradation, no other repair or renovation included (stabilize)

1 Structural		
	a. Foundation work (piers)	\$8,000.00
	b. Miscellaneous repair	\$5,000.00
	c. Ceiling girder	\$1,500.00
	d. Sheath roof	\$5,000.00
Structural Subtotal		\$19,500.00
2 Roof		\$9,000.00
	Remove existing roof and dispose of legally. Install 15# building felt and new 3-tab shingles with flashing over new sheathing (new sheathing included in Structural)	
Total Restore Existing Farm House to Stabilize:		\$28,500.00

CONTENTS

Infrastructure Feasibility Report

State Historic Preservation Report

Asbestos and Lead Paint Abatement Estimate

Asbestos NESHAP Inspection Report

Lead Paint Report

Lead Paint Lab Results