


Title and Approval Page


Sampling and Analysis Plan (SAP)
Commercial Properties
Indoor Air and Soil Vapor Intrusion Study
Raymark Site, OU-2
Stratford, CT

November 2011

U.S. ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGIONAL LABORATORY
OFFICE OF ENVIRONMENTAL MEASUREMENT & EVALUATION
11 TECHNOLOGY DRIVE
NORTH CHELMSFORD, MASSACHUSETTS 01863


Date: 11/22/11
Ron Jennings, EPA RPM, Office of Site Remediation & Restoration


Date: 11/28/11
Peter Kahn, OEME ECA Air Team Project Lead


Date: 11/30/11
Robert Judge, OEME ECA Air Team Leader


Date: 11/30/11
Dan Boudreau, OEME Chemistry Team Leader

1. Introduction

This site specific SAP was written in conjunction with the approved Generic Air QAPP, revision 4, November, 2010. The general procedures and quality control criteria to be used for the project are provided in the generic QAPP. This SAP includes site specific information along with a site map, sample locations, the number and type of samples to be collected including the quality control samples, the project manager and sampling team members, and any other pertinent information related to this project.

SAP Distribution List:

| Name | Title | Organization | Phone # |
|----------------|---------------|------------------------------------|--------------|
| Ron Jennings | RPM | EPA Region 1 OSRR Remedial Program | 617-918-1242 |
| Rick Sugatt | Risk Assessor | EPA Region 1 OSRR | 617-918-1415 |
| Dan Curran | Chemist | EPA Region 1 OEME EIA | 617-918-8653 |
| Scott Clifford | Chemist | EPA Region 1 OEME EIA | 617-918-8631 |
| Alysha Lynch | Scientist | EPA Region 1 OEME ECA | 671-918-8381 |

2. Background

Site Description and Background

The Raymark Industries, Inc. Superfund Site (the Site) consists of 500 plus acres of land located in Stratford, Fairfield County, Connecticut (CT). Raymark Industries, Inc. operated for 70 years from 1919 until 1989 manufacturing automotive and heavy brake friction components. During its operation, Raymark waste was disposed of as “fill” material in various locations in Stratford, including the Raymark Facility, various commercial and residential properties, and in wetlands adjacent to the Housatonic River. In 1993 the Agency for Toxic Substances and Disease Registry (ATSDR) performed a health assessment in response to a citizen petition and shortly thereafter issued a Public Health Advisory for the Raymark Facility and locations around the Town of Stratford where manufacturing wastes from the former Raymark Facility had come to be located. EPA listed the Site on EPA’s National Priorities list (NPL) of Superfund sites on April 25, 1995. A public water supply provides drinking water to the area of concern for Raymark waste. There is no known use of groundwater for any purpose in the area. The Site includes the (former) Raymark Industries, Inc. Facility and other locations where Raymark waste has come to be located. Raymark Industries, Inc. is bankrupt, and the cleanup is being conducted by the EPA, in coordination with CTDEEP.

The site has been divided into nine parts or Operable Units (OUs). For the purposes of this SAP, the work falls under Operable Unit 2: Groundwater (Site wide). The groundwater investigation focuses on a 500 acre area extending from the Facility to a surface water body (Ferry Creek) to the Housatonic River. Contaminants in the groundwater include volatile organic compounds (VOCs) and metals. During 2000-2002 extensive groundwater, soil gas, indoor air and sub-slab evaluations were performed, which found VOCs to be volatilizing from the groundwater into buildings (primarily residential dwellings). As a result, during 2003-2004, EPA and CTDEEP installed 106 sub-slab ventilation systems into residential homes, two of which were commercial buildings, to mitigate potential vapor intrusion and human health exposure. EPA is now in the

process of focusing on additional commercial properties that have the potential to be impacted by the VOCs volatilizing from the groundwater.

3. Project Description/Objective

EPA Remedial Project Manager (RPM), Ron Jennings has requested indoor air and, where feasible, sub-slab soil gas samples be collected inside nine commercial buildings and within two to three condominium/apartments to form lines of evidence for completion of a vapor intrusion pathway risk evaluation related to contaminants associated with the Site. Specifically evaluation of the following buildings/addresses has been requested:

| Address | Current Building Use |
|-------------------------------|--|
| 411 Barnum Ave. (3 buildings) | Retail shopping plaza, restaurants |
| 326 Ferry Blvd. | Restaurant/bar |
| 444 Ferry Blvd. | Retail |
| 500 Ferry Blvd. | Office space |
| 608 Ferry Blvd. | Office space (currently unoccupied) |
| 100 Veterans Way | Restaurant/bar |
| 335 Ferry Blvd. | Office space (three separate businesses) |
| Ferry Court condominium | Residential |

411 Barnum Ave. is a shopping plaza that contains 16 separate businesses and a 14 screen movie theatre. The property also has two separate buildings occupied by a McDonalds Restaurant and a 99 Restaurant. These three buildings are constructed on slab-on-grade foundations assumed to be 8 to 10 inches thick, with all interior floors covered with carpet, wood or tile. There is some evidence that the foundations have conduits incorporated into the slab at unknown locations. Considering the thickness of the slab, floor coverings, and the presence of conduits in the concrete slab, drilling holes into the slab for installing sub-slab sampling probes has been determined to be impractical. Therefore, only indoor air samples will be collected within the three buildings at 411 Barnum Ave (shopping plaza, McDonalds, and the 99 Restaurant).

The slab-on-grade concrete foundation of 326 Ferry Blvd. reportedly rests on driven piles. There reportedly is also a small, fairly inaccessible crawl space between the slab-on-grade foundation and the building floor. The building interior floors, which are all covered with carpet, wood, or tile, together with the inaccessible crawl space between the floor and foundation, make access to the slab impractical for installing sub-slab sampling probes. Therefore, only indoor air samples will be collected at 326 Ferry Boulevard.

Buildings located at 444 Ferry Blvd. (Par Pool & Spa), 500 Ferry Blvd. (Risk International, Inc.), 608 Ferry Blvd. (unoccupied office building), 100 Veterans Way (VFW Post 9460), 335 Ferry Blvd. (Salce Building, three separate businesses) and Ferry Court condominium/apartment complex on Ferry Blvd. all have concrete slab basements or a slab on-grade foundation where sub-slab soil gas samples can be collected. 500 Ferry Blvd. is the only building with a finished basement and zoned as both a residential/commercial property.

If property access agreements have been granted, sampling at these properties will be performed during December 2011 and sometime between late spring and early summer to evaluate potential changes in concentration during the heating and non-heating seasons.

4. Sampling Design

At 444 Ferry Blvd., 500 Ferry Blvd., 100 Veterans Way, 608 Ferry Blvd., 335 Ferry Blvd., and within the Ferry Court condominium/apartment complex, soil gas grab samples will be collected from 2 to 3 sub-slab sampling locations and indoor air samples will be collected from the basement and/or first floor areas. The buildings located at 411 Barnum Ave. and 326 Ferry Blvd. will have samples collected only from inside the buildings, no sub-slab samples will be collected. These indoor air samples will be collected over either an 8-hour or 24-hour period depending on when access is granted and occupational or residential use of each individual building. Indoor air data will be compared to corresponding background outdoor air samples that will be collected in the area where the buildings are located. For quality control purposes, one collocated canister sample will be collected on each day that indoor air samples are collected. All canister samples will be analyzed for the VOCs listed on Table 1, particularly the target compounds trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE) and vinyl chloride (VC) using a GC/MS.

Sub-slab soil gas sampling probes will be installed by Peter Kahn at the locations described above. Soil gas samples will be collected using EPA Region I Standard Operating Procedure for Sub-Slab Soil Gas Sampling, April 1, 2011, Revision 2. Scott Clifford will collect the soil gas samples and immediately analyze them on-site using EPA's Mobile Laboratory. Confirmation canister grab samples will also be collected at selected locations and then analyzed at the EPA Regional Laboratory using a GC/MS. In addition, grab air samples will be collected by Scott Clifford using a glass syringe from areas where soil gases have the greatest potential to migrate into the building (i.e. openings in the concrete floor, drain pipes, etc.). These samples will be analyzed on-site in the mobile lab.

The collected data will be compared to the EPA Regional Screening Levels (RSL). Screening levels for the target compounds are provided in the table below.

| Compound | EPA RSL Residential Air ¹ | EPA RSL Industrial Air ¹ | EPA Region 1 Reporting Limits |
|--------------------|--------------------------------------|-------------------------------------|-------------------------------|
| Trichloroethene | 0.432 µg/m ³ | 2.99 µg/m ³ | 0.27 ug/m ³ |
| 1,1-Dichloroethene | 210 µg/m ³ | 880 µg/m ³ | 0.20 ug/m ³ |
| Vinyl Chloride | 0.16 µg/m ³ | 2.8 µg/m ³ | 0.13 ug/m ³ |

¹ EPA RSL = EPA Regional Screening Level (November 2011)

To obtain additional information about the building, an Indoor Air Assessment Survey (see attachment) will be completed. EPA will be asking the building owner to close all windows and doors for a 12 - 24 hour period prior to the survey and during the sampling period.

Sample Location, Estimated Number and Type of Samples

| Building Location | Sample Location | Sample Type | Sample Number |
|-----------------------------|--|---|----------------------|
| 444 Ferry Blvd. | Basement | canister indoor air indoor air syringe grab | 1 canister |
| | Basement two sub-slab sample locations along center line away from walls | soil gas canister grab soil gas syringe grab | 1 canister |
| | First floor show room area | canister indoor air indoor air syringe grab | 1 canister |
| | First floor south side, concrete slab on-grade one sub-slab sample | soil gas syringe grab | |
| 500 Ferry Blvd. | Basement (finished) | canister indoor air indoor air syringe grab | 1 canister |
| | Basement two sub-slab sample locations | soil gas canister grab soil gas syringe grab | 1 canister |
| | Crawl space, east side of basement area | canister indoor air indoor air syringe grab | 1 canister |
| | First floor office space | canister indoor air indoor air syringe grab | 1 canister |
| 608 Ferry Blvd. (vacant) | First floor three spaces | canister indoor air indoor air syringe grab | 3 canisters |
| | First Floor concrete slab on-grade three sub-slab sample locations along center line away from walls | soil gas canister grab soil gas syringe grab | 1 canister |
| 326 Ferry Blvd. | Restaurant two story concrete slab on-grade, first floor | canister indoor air indoor air syringe grab | 2 canisters |
| 100 Veterans Way | Basement (lower level) | canister indoor air indoor air syringe grab | 1 canister |
| | Basement lower level three sub-slab sample locations along center line away from walls | soil gas canister grab soil gas syringe grab | 1 canister |
| | First floor function room | canister indoor air indoor air syringe grab | 1 canister |

Sample Location, Estimated Number and Type of Samples

| Building Location | Sample Location | Sample Type | Sample Number |
|---|--|---|---|
| 335 Ferry Blvd. | Street level three separate businesses | canister indoor air indoor air syringe grab | 3 canisters |
| | First floor four garage bays concrete slab on-grade, 4 sub-slab sample locations one in each of the four garage bays | soil gas canister grab soil gas syringe grab | 1 canister |
| | First floor four garage bays indoor air sample locations one in each of the three garage bays that are below the businesses | canister indoor air indoor air syringe grab | 3 canisters |
| Ferry Court (two to three condominiums) | Basement (each unit) | canister indoor air indoor air syringe grab | 1 canister x 3 units = 3 |
| | Basement (each unit) two sub-slab sample locations | soil gas canister grab soil gas syringe grab | 1 canister x 3 units = 3 |
| | First floor (each unit) | canister indoor air indoor air syringe grab | 1 canister x 3 units = 3 |
| 411 Barnum Ave. | Shopping Plaza one story concrete slab on-grade with 16 separate businesses and a 14 screen movie theatre, number and locations to be determined | canister indoor air | approximate 1 canister x 14 = 14 |
| | McDonalds Restaurant | canister indoor air | 1 canister |
| | 99 Restaurant | canister indoor air | 2 canisters |
| Background | outside buildings | canister outside air | 1 canister per day (approximate 5) |
| QC Samples | Selected building, one per day | canister indoor air | 1 canister per day (approximate 5) |
| | | | Approximate 59 Canisters Total |

Sampling and Analytical Summary Table

| Parameter | Matrix | Number of Samples (Include QC) | Analytical Methods | Sampling SOPs | Sample Type | Preservation | Maximum Holding Time |
|-----------|----------------------|-----------------------------------|---------------------------------|--|---------------|--------------|----------------------|
| VOCs | indoor & ambient air | 38 (10%) | EIASOP-Aircan10 | ECASOP-Canister Sampling SOP5 | 6 L canisters | none | 28 days |
| VOCs | indoor & ambient air | 27 (10%) | EIASOP-FLDGRAB4 (field work) | EIASOP-FLDGRAB4 (field work) | syringe | none | none |
| VOCs | soil gas | 23 (10%) | EIASOP-FLDGRAB4 (field work) | ECASOP-Sub-slab Soil Gas Sampling SOP2 | syringe | none | none |
| VOCs | soil gas | 21 (10%) | EIASOP-Aircan10 | ECASOP-Sub-slab Soil Gas Sampling SOP2 | 6 L canisters | none | 28 days |

5. Site Specific Issues

- Property access agreements must be granted before work can begin.
- When drilling through building concrete slabs field sampling team must be aware of conduits within and under slab.

6. Site Map

See map below.

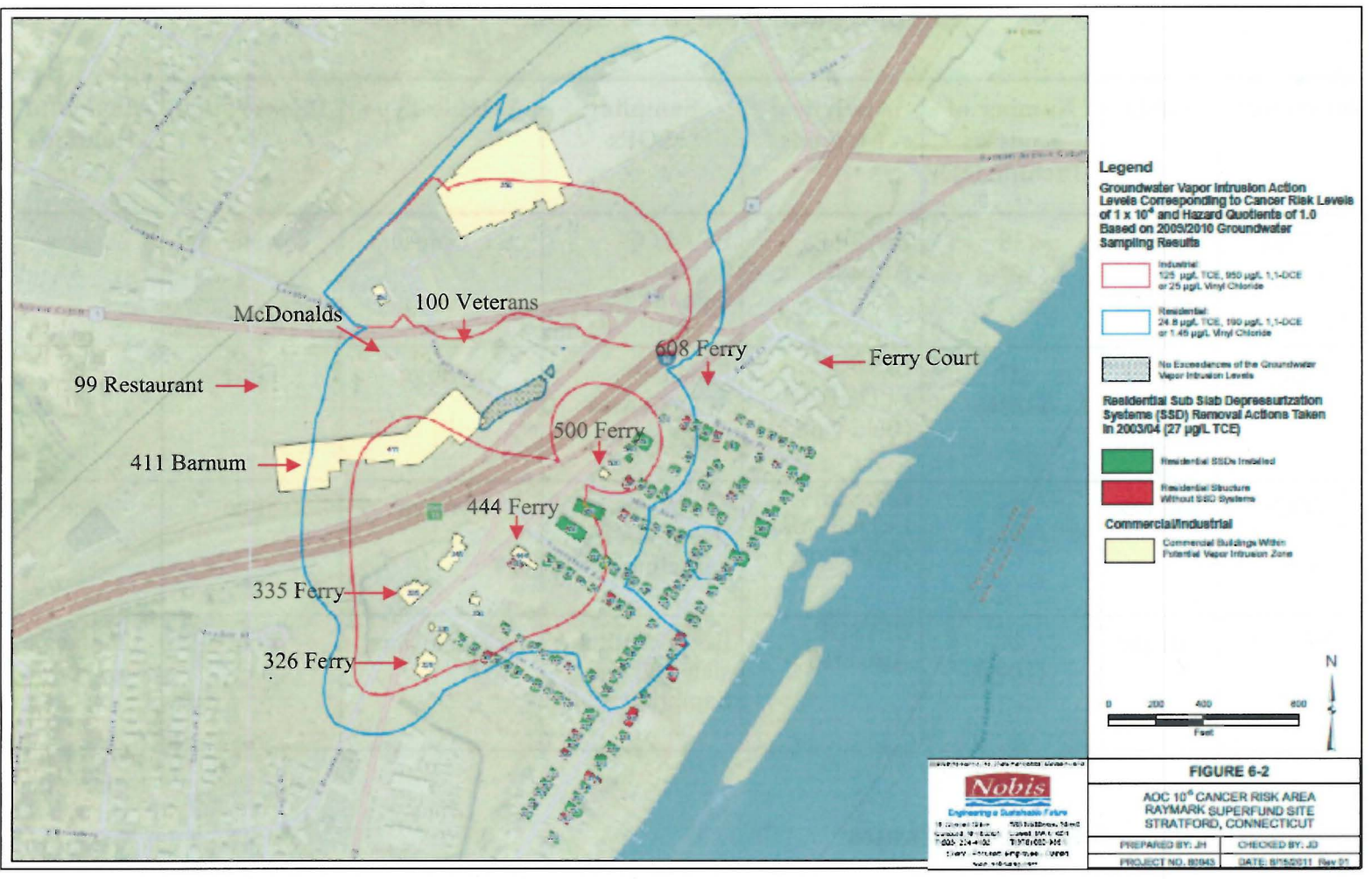


TABLE 1- EPA METHOD TO15 TARGET VOC LIST

| EPA Region I TO-15 VOC Compounds | Reporting ppb/v | Limits ug/m ³ |
|-------------------------------------|--------------------|-----------------------------|
| 1, 1, 1-Trichloroethane | 0.05 | 0.27 |
| 1, 1, 2, 2-Tetrachloroethane | 0.05 | 0.34 |
| 1, 1, 2-Trichloroethane | 0.05 | 0.27 |
| 1, 1-Dichloroethane | 0.05 | 0.20 |
| 1, 1-Dichloroethylene | 0.05 | 0.20 |
| 1, 2, 4-Trichlorobenzene | 0.05 | 0.37 |
| 1, 2, 4-Trimethylbenzene | 0.05 | 0.25 |
| 1, 2-Dibromoethane | 0.05 | 0.38 |
| 1, 2-Dichlorobenzene | 0.05 | 0.30 |
| 1, 2-Dichloroethane | 0.05 | 0.20 |
| 1, 2-Dichloropropane | 0.05 | 0.23 |
| 1, 3, 5-Trimethylbenzene | 0.05 | 0.25 |
| 1, 3-Butadiene | 0.10 | 0.22 |
| 1, 3-Dichlorobenzene | 0.05 | 0.30 |
| 1, 4-Dichlorobenzene | 0.05 | 0.30 |
| 2-Hexanone (methylbutylketone) | 0.05 | 0.21 |
| 4-Ethyl Toluene | 0.05 | 0.25 |
| Acrylonitrile | 0.05 | 0.11 |
| Allyl Chloride | 0.05 | 0.16 |
| Benzene | 0.05 | 0.16 |
| Benzylchloride | 0.05 | 0.26 |
| Bromodichloromethane | 0.05 | 0.33 |
| Bromoform | 0.05 | 0.52 |
| Carbon Tetrachloride | 0.05 | 0.31 |
| Chlorobenzene | 0.05 | 0.23 |
| Chloroethane | 0.05 | 0.13 |
| Chloroform | 0.05 | 0.24 |
| Cyclohexane | 0.05 | 0.17 |
| Dibromochloromethane | 0.05 | 0.43 |
| Dichlorodifluoromethane (F12) | 0.05 | 0.25 |
| Dichlorotetrafluoroethane | 0.05 | 0.35 |
| Ethylbenzene | 0.05 | 0.22 |
| Heptane | 0.05 | 0.21 |
| Hexachloro-1, 3-butadiene | 0.05 | 0.53 |
| Hexane | 0.05 | 0.18 |
| Methyl Ethyl Ketone | 0.05 | 0.15 |
| Methyl Isobutyl Ketone | 0.05 | 0.21 |
| Methyl-t-butyl ether | 0.05 | 0.18 |
| Methylbromide (Bromomethane) | 0.05 | 0.19 |
| Methylchloride (Chloromethane) | 0.05 | 0.10 |
| Methylene Chloride | 0.05 | 0.17 |
| Styrene | 0.05 | 0.21 |
| Tetrachloroethene | 0.05 | 0.34 |
| Tetrahydrofuran | 0.05 | 0.15 |
| Toluene | 0.05 | 0.19 |
| Trichloroethene | 0.05 | 0.27 |
| Trichlorofluoromethane | 0.05 | 0.28 |
| Trichlorotrifluoroethane | 0.05 | 0.38 |
| Vinyl Bromide | 0.05 | 0.22 |
| Vinylchloride | 0.05 | 0.13 |
| Cis-1, 2-Dichloroethene | 0.05 | 0.20 |
| Cis-1, 3-Dichloropropene | 0.05 | 0.23 |
| m, p-Xylene | 0.10 | 0.43 |
| o-Xylene | 0.05 | 0.22 |
| Trans-1, 2-Dichloroethene | 0.05 | 0.20 |
| Trans-1, 3-Dichloropropene | 0.05 | 0.23 |

Indoor Air Assessment Survey
SURVEY OF OCCUPIED DWELLING

Date: _____

(1) Name: _____

Address:

(2) Type of Structure: Condominium, Townhouse, Single Family Home, Other _____

(3) Size of Structure: _____ floors _____ basement

(4) Age of Structure: _____ years

(5) Construction of Structure: Wood, brick, concrete, cinder block, other

(6) Number of Occupants: _____ Person (s) Duration of residency:

(7) Foundation: Concrete slab, footings on earth, other

(8) Unit Description: _____

| Room | Furnishings (tables, chairs, etc.) none, light, moderate, heavy | Wall covering: none, paint (oil/water-based), wallpaper, paneling, | Month/year last painted or wallpapered |
|-------|--|--|--|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

Comments

SURVEY OF OCCUPIED DWELLING

- (9) Heating: Fuel type: electric, gas, oil, wood, coal, fireplace, other _____
Conveyance system: hot water, forced-air, other _____
- (10) Air Conditioning: Central air conditioning, window air conditioning unit (s),
other _____
- (11) Ventilation: Fans: room, ceiling, attic ventilate using the fan only mode of your central air conditioning
or forced air heating system? (Yes/No)

Summer conditions: open window (never, rarely, usually)
- (12) Termite/Pesticide Treatment: None, yes, unknown

Type of pest controlled: _____
- (13) Water Heater: Type: gas, electric, other _____

Location: basement, kitchen, garage, other _____
- (14) Cooking Applications: Electric, gas, exhaust hood present, other _____
- (15) Use of Consumer Products: Hardly Ever (less than once/month), Occasionally (about once/month),
Regularly (about once/week), Often (more than once/week)

| <u>Product</u> | <u>Frequency of Use</u> | | | |
|------------------------|-------------------------|---------------|------------|-------|
| Spray-on deodorant | Hardly ever, | Occasionally, | Regularly, | Often |
| Aerosol deodorizers | Hardly ever, | Occasionally, | Regularly, | Often |
| Insecticides | Hardly ever, | Occasionally, | Regularly, | Often |
| Disinfectants | Hardly ever, | Occasionally, | Regularly, | Often |
| Window cleaners | Hardly ever, | Occasionally, | Regularly, | Often |
| Spray-on oven cleaners | Hardly ever, | Occasionally, | Regularly, | Often |
| Nail polish remover | Hardly ever, | Occasionally, | Regularly, | Often |
| Hair sprays | Hardly ever, | Occasionally, | Regularly, | Often |

Title: Sampling and Analysis Plan Raymark Site, Stratford, CT

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SURVEY OF OCCUPIED DWELLING
Floor Plan Sketch

Address

