Form# P 04

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND

BUREAU OF INSPECTION

Please Read Application And Notes, If Any, Attached

PERMIT

Permit Number: 060213

CITY OF PORTLAND

This is to certify that FORE & WHARF LLC /Ke Welton

has permission to Install a Kitchen Hood Exha System

AT 50 WHARF ST L 032 V014001

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of buildings and structures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

Notification of inspection must be given and written permission procured before this building or part thereof is lathed or closed-in. 24 HOUR NOTICE IS REQUIRED.

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

OTHER REQUIRED APPROVALS

Fire Dept. Jay Kelley 3/17/06

Health Dept.

Appeal Board

Other

Department Name

Director - Building & Inspection Services 3/16/06

PENALTY FOR REMOVING THIS CARD

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 to schedule your inspections as agreed upon

Permits expire in 6 months, if the project is not started or ceases for 6 months.

The Owner or their designee is required to notify the inspections office for the following inspections and provide adequate notice. Notice must be called in 48-72 hours in advance in order to schedule an inspection:

By initializing at each inspection time, you are agreeing that you understand the inspection procedure and additional fees from a "Stop Work Order" and "Stop Work Order Release" will be incurred if the procedure is not followed as stated below.

A Pre-construction Meeting will take place upon receipt of your building permit.

___ Footing/Building Location Inspection;	Prior to pouring concrete
___ Re-Bar Schedule Inspection:	Prior to pouring concrete
___ Foundation Inspection:	Prior to placing ANY backfill
___ **Framing/Rough Plumbing/Electrical:**	Prior to any insulating or drywalling
___ **Final/Certificate** of Occupancy:	Prior to any occupancy of the structure or use. NOTE: There is a $75.00 fee per inspection at this point.

Certificate of Occupancy is not required for certain projects. Your inspector can advise you if your project requires a Certificate of Occupancy. All projects DO require a final inspection

___ **If** any of the inspections do not occur, the project cannot go on to the next phase, REGARDLESS OF THE NOTICE OR CIRCUMSTANCES.

N/A **CERIFICATE OF OCCUPANICES MUST BE ISSUED AND PAID FOR,** BEFORE THE SPACE MAY BE OCCUPIED

X _____ 3.20.06

Signature of Applicant/Designee Date

Jeanne Bourke 3/20/06

Signature of Inspections Official Date

CBL: 32-V-14 Building Permit #: 06-0213

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, **Fax:** (207) 874-8716

CITY OF PORTLAND

Permit No:	Issue Date:	CBL:
06-0213		032 V014001

Location of Construction:	Owner Name:	Owner Address:	Phone:
50 WHARF ST	FORE & WHARF LLC	6 WEBBER WAY	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Kenny Welton -	Portland	2073293346
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	**Zone:**
		Alterations - Commercial	

Past Use:	Proposed Use:	Permit Fee:	Cost of Work:	CEO District:
Commercial	Commercial Install Kitchen Hood Exhaust System	$156.00	$15,000.00	1

FIRE DEPT: ☑ Approved ☐ Denied

Signature: LK P.F.D. 3/17/06

INSPECTION:
Use Group: Type: N/A
HVAC
LOCAL EXH HOOD

Signature: 3/15/06

Proposed Project Description:
Install a Kitchen Hood Exhaust System

F.P. APPROVAL FOR MECH ONLY. SEND REQUIRES SEPARATE REVIEW.

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: ☐ Approved ☐ Approved w/Conditions ☐ Denied

Signature: Date:

Permit Taken By:	Date Applied For:
dmartin	02/16/2006

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
☐ Shoreland	☐ Variance	☐ Not in District or Landmark
☐ Wetland	☐ Miscellaneous	☐ Does Not Require Review
☐ Flood Zone	☐ Conditional Use	☐ Requires Review
☐ Subdivision	☐ Interpretation	☑ Approved
☐ Site Plan	☐ Approved	☐ Approved w/Conditions
Maj ☐ Minor ☐ MM ☐	☐ Denied	☐ Denied
Date:	Date:	Date: JSH 3/1/06

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree *to* conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT | ADDRESS | DATE | PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE | DATE | PHONE

City of Portland, Maine - Building or Use Permit
389 Congress Street, 04101 Tel: (207) 874-8703, **Fax:** (207) 874-8716

Permit No:	Date Applied For:	CBL:
06-02 13	02/16/2006	032 V014001

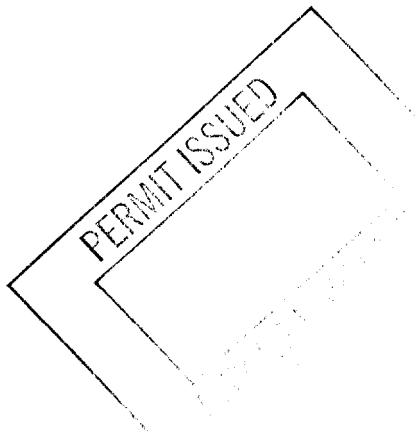
Location of Construction:	Owner Name:	Owner Address:	Phone:
50 WHARF ST	FORE & WHARF LLC	6 WEBBER WAY	
Business Name:	**Contractor Name:**	**Contractor Address:**	**Phone**
	Kenny Welton -	Portland	(207) 329-3346
Lessee/Buyer's Name	**Phone:**	**Permit Type:**	
		Alterations - Commercial	

Proposed Project Description:
Install a Kitchen Hood Exhaust System

Dept:	Historical	**Status:**	Approved	**Reviewer:**	Scott Hanson	**Approval Date:**	02/22/2006
Note:						**Ok to Issue:**	☑
Dept:	Building	**Status:**	Approved with Conditions	**Reviewer:**	Mike Nugent	**Approval Date:**	03/15/2006
Note:						**Ok to Issue:**	☐
Dept:	Fire	**Status:**	Approved	**Reviewer:**	Jay Kelley	**Approval Date:**	02/17/2006
Note:						**Ok to Issue:**	☑

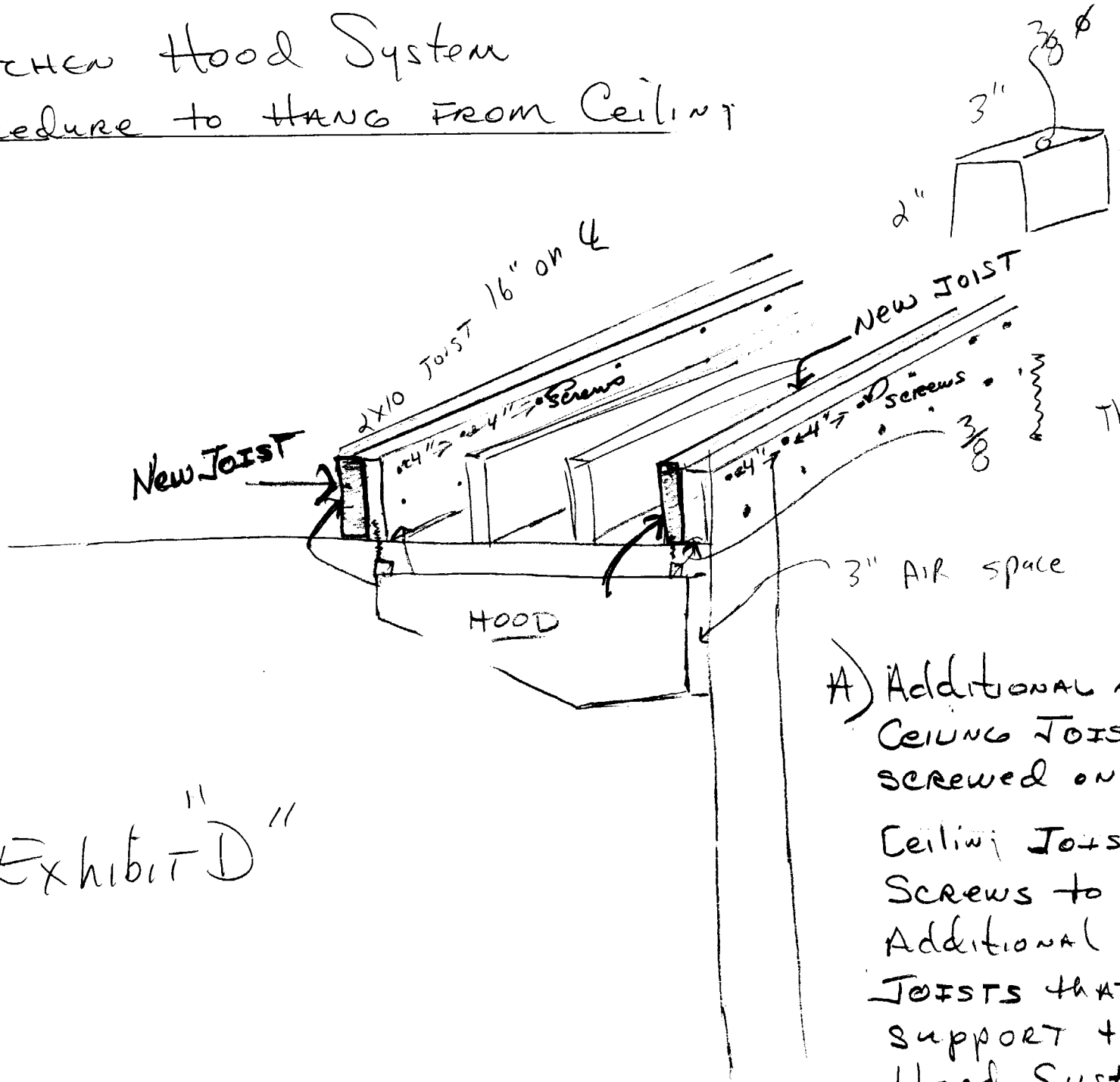
1) Install hood system to manufactures specifications

Comments:
3/8/2006-mjn: Need some structural info Left message w Archie Giobbi and Tigpro



Kitchen Hood System

Procedure to Hang from Ceiling



A) Additional 2"X10"x14' Ceiling Joists will be screwed on to EXISTING Ceiling Joists with 4" Screws to add Additional Support to Joists that will support the 55916 Hood System.

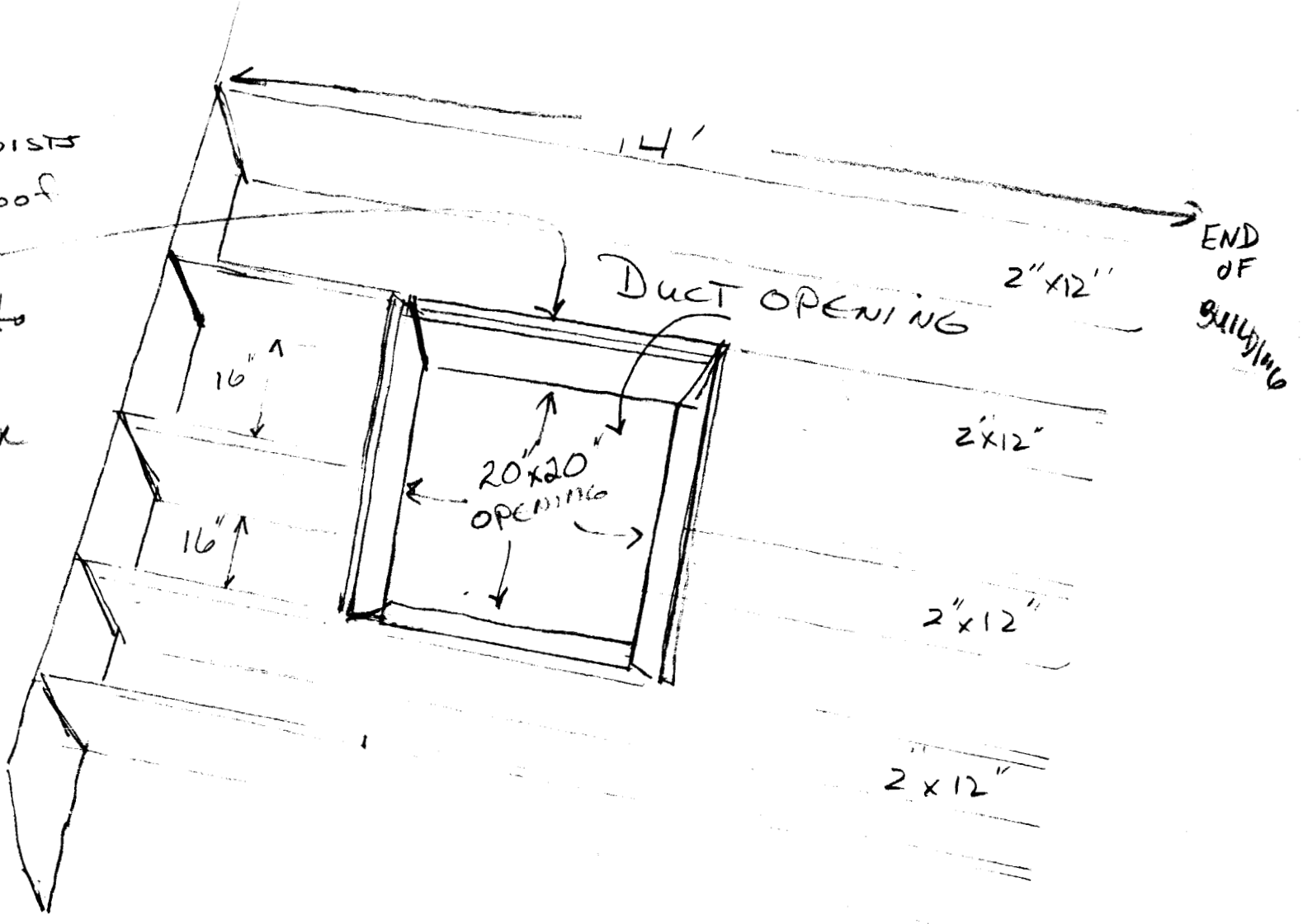
"Exhibit D"

FRAMING DETAIL FOR ROOF

ROOF RAFTER FRAMING FOR DUCT-WORK OPENING

Legend

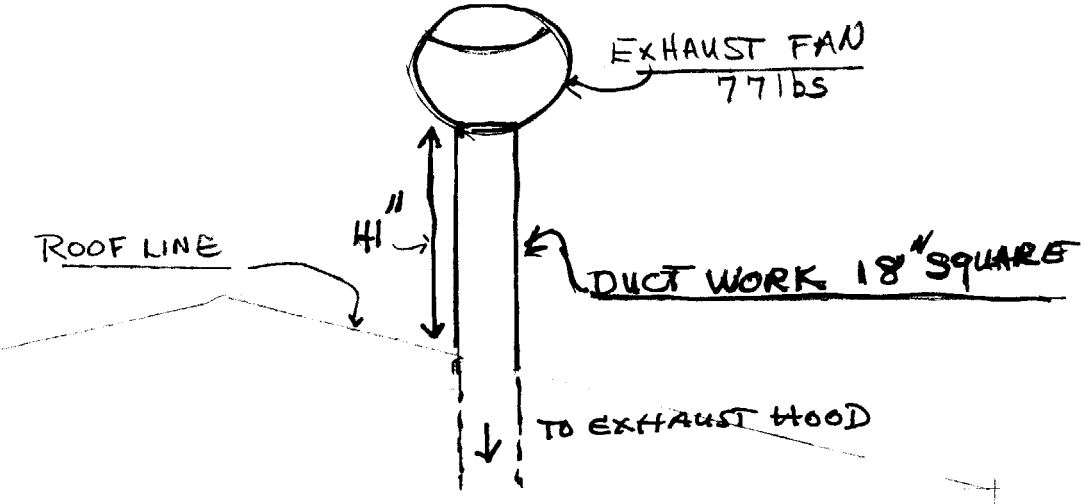
1. Double-2x12 Joists for Boxing-In Roof Rafters.
2. Double Joists to be Secured with 4" Screws AND/OR Joist-Hangers



CHIANG MAI RESTAURANT

9-13 UNION ST. SO WHIDBEY ISLAND

EXTERIOR LAYOUT OF EXHAUST FAN WITH ROOF HEIGHT DIMENSIONS



9-13 UNION ST

A.K.A.

50 WHARF ST

Chiang Mai
9-13 Union St
(Union / wharf
50 wharf)

1. Exhaust Fan weight
77 lbs

2. Fresh Air (Intake)
Fan 131 lbs

3. 10' Hood Unit System
554 lbs

4.  ~~18"~~ Height off Roof Level

Must be 40"

Provided By Archie Giobbi 3/10/06

32-V-14

General Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property **within** the **City,** payment arrangements must be made before permits of any kind **are** accepted.

Location/Address of Construction: 9-13 Union St. / 50 Wharf

Total Square Footage of ~~Proposed Structure~~ Leased Space: 1000 s.f. I

Square Footage ~~of Lot~~ Space: 1000 s.f. I

Tax Assessor's Chart, Block & Lot — Chart# 32 Block# V Lot# 14

Owner: Steve Baumann, Wharf & Fore LLC, 6 Webber Way, Falmouth, ME

Telephone: 772-1333, The Bouchos Co

Lessee/Buyer's Name (If Applicable): Voeuth Hem, 528 Washington Ave, Portland, Me 04103

Applicant name, address & telephone: ← Same

Cost Of Work: $ 15,000.00

Fee: $ 156.00

C of O Fee: $

Current Specific use: Vacant

Proposed Specific use: Food Service - Thai Food.

Project description: Installation of kitchen hood exhaust system by TigPro Installation, Kenny Welton, owner. Tel# 329-3346

Contractor's name, address & telephone: Kenny Welton - TigPro Installs

Who should we **contact** when the permit is ready: Kenny Welton

Mailing address: Phone: 329-3346

Contact Person: Archie Giobbi 232-5343

Please submit all of the information outlined in the Commercial Application Checklist. Failure to do so will result in the automatic denial of your permit.

In order to be **sure** the **City** fully understands the **full** scope of the project, the Planning and Development Department may request additional **information** prior to **the** issuance of a permit. For further **information** visit us on-line at www.portlandmaine.gov, stop by the Building Inspections office, **room** 315 City Hall or call 874-8703.

I hereby certify that I **am** the Owner of record of the named property, or that the owner of record authorizes the proposed **work** and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to **all** applicable laws of **this** jurisdiction. In addition, if a permit for work described in **this** application is issued, I certify that the Code Official's authorized representative **shall** have the authority to enter **all** areas covered by **this** permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

Signature of applicant: Voeuth Hem **Date:** 2/16/06

RECEIVED
FEB 16 2006
DEPT. OF BUILDING INSPECTION
CITY OF PORTLAND, ME

This is not a permit; you may not commence ANY work until the permit is issued.

COVER SHEET

CHIANG MAI, THAI RESTAURANT
9-13 UNION ST
PORTLAND, MAINE

Applicant's Intention is to install a Kitchen Hood Exhaust System to service his intended new business, A THAI Family Restaurant.

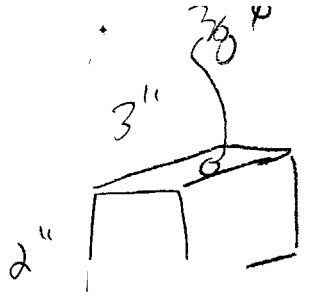
Voeuth Hem, Applicant, has hired Steve Doel of Bennett Engineering, Freeport, Maine to do the necessary drawings & Engineering Required by the City of Portland.

Also, Mr Hem, has hired Mr. Kenny Welton, TIGPRO INSTALLATIONS & FABRICATION to install the Hood System and all components needed to complete the job.

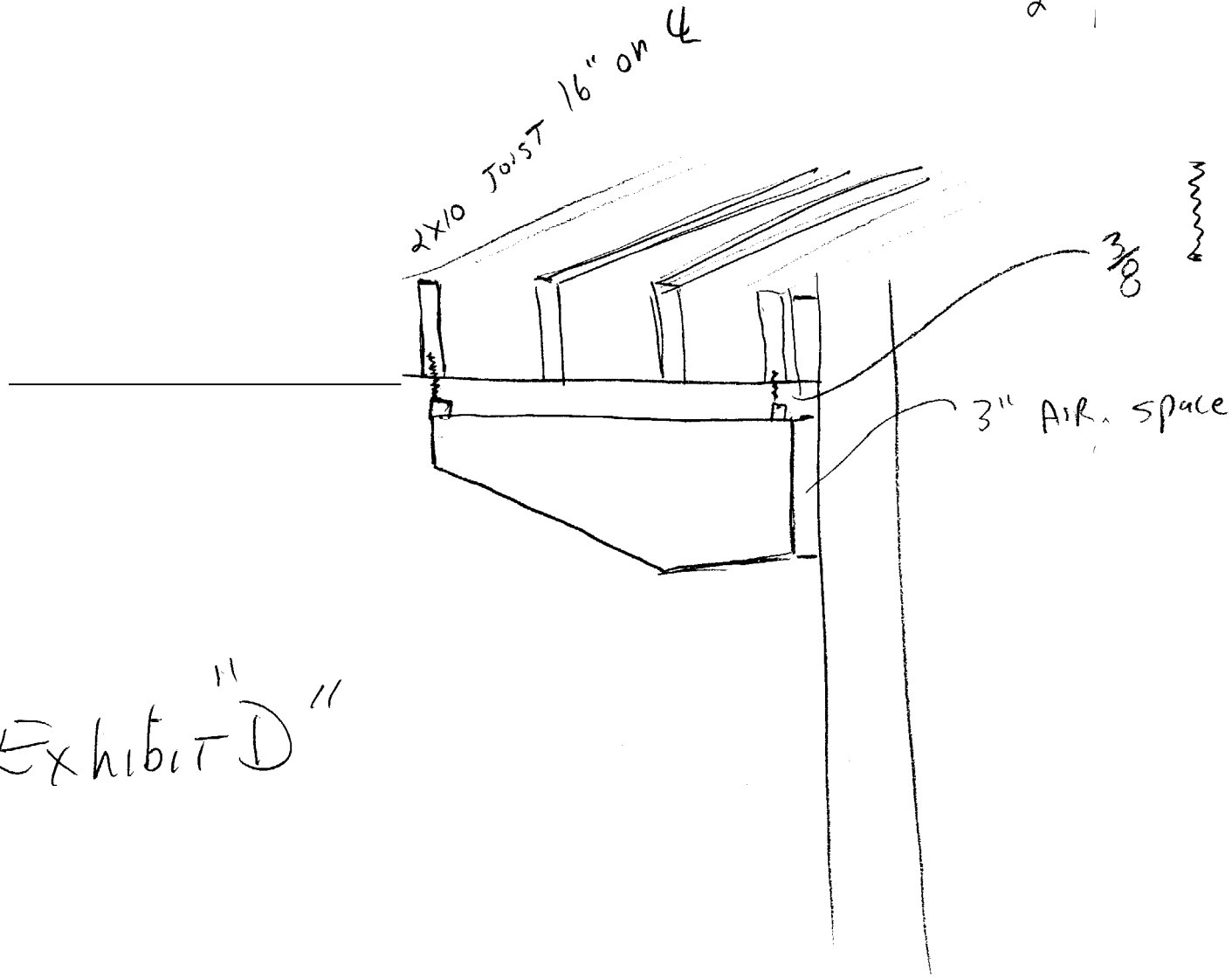
Voeuth Hem

Kitchen Hood System

Brackets to Hang From Ceiling



11 gauge Brackets welded top of Hood for support



■ Wood Lag 6" Long for Support Hood.

"Exhibit D"

BENNETT ENGINEERING
CONSULTING ENGINEERS
BENNETT ROAD P.O. BOX 297
FREEPORT, MAINE 04032
(207) 865-9475

JOO K and D's, Portland, ME
DESIGNED BY SP Doel DATE 1 FEB 06
CHECKED BY SP Doel DATE 1 FEB 06
SCALE Not to Scale No. MSK-4

General Notes

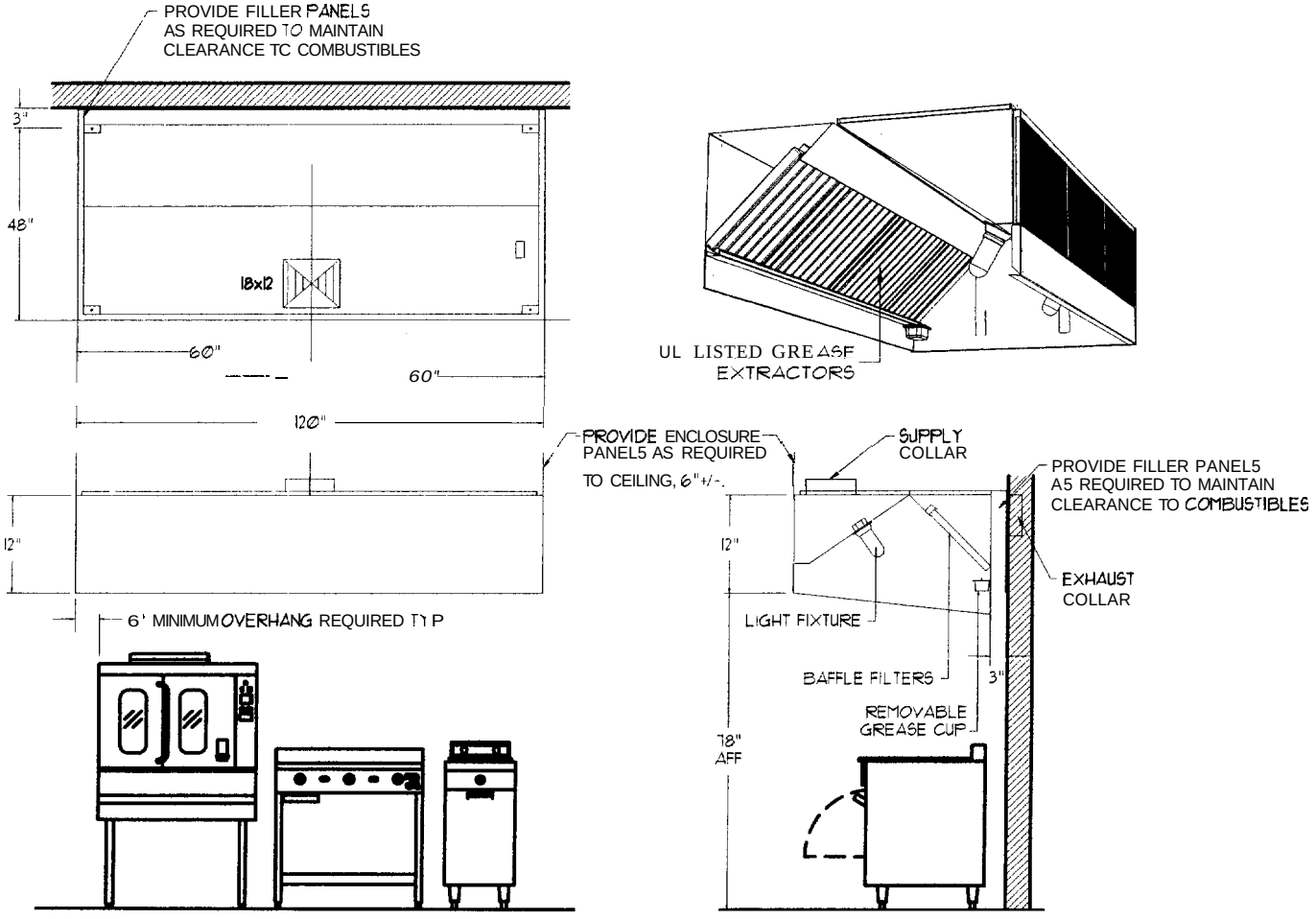
1. Exhaust ductwork shall be constructed of 16 gauge black carbon steel with welded Joints and bolted and gasketted cleanouts per NFPA96 (12"x12" minimum size). 18" minimum clearances to combustibles shall be maintained or combustibles shall be protected with 3M "Firemaster" Duct Wrap, installed in accordance with the manufacturers recommendations. The alternative duct system shall be Ampco Model IVSI UL-listed grease duct with 1" clearance to combustibles. Grease duct shall be installed in accordance with the manufacturers recommendations and shall be constructed of 20 gauge Type 304 stainless steel inner liner and 24 gauge aluminized steel outer jacket. Rovide cleanouts as required.
2. Make-up air ductwork shall be constructed of 22 gauge galvanized eteel.
3. The compensating hood exhaust fan shall be a Greenheck Model CUBE 161-5, Cook, or approved equal, UL-listed for grease exhaust applications, 2800 cfm @ .75" w.g. static pressure, 1039 rpm, belt-drive, 3/4 Hp. Furnish with an 18"H. ventilated curb, grease trap with drain connection and disconnect switch.
4. The hood automatic fire suppression system shall be Ansul or Rangeguard, wet-chemical type per NFPA.
5. The hood and ductwork installation shall comply with the IBC 2003 and NFPA 96, with stainless steel grease extractors.
6. A "capture and containment" performance test shall be performed at the completion of the installation per the IBC.

Kitchen Hood System

STATE OF MAINE
STEPHEN P. DOEL
No. 3807
REGISTERED
PROFESSIONAL ENGINEER

BENNETT ENGINEERING
CONSULTI NG ENGI NEERS
BENNETT ROAD P.O. BOX 297
FREEPORT, MAINE 04032
(207) 865-9475

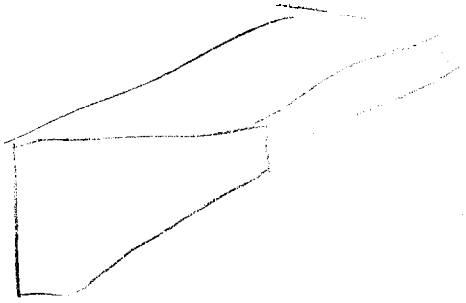
JOB K and D's, Portland, ME
DESIGNED BY SP Doel DATE 1FEB 06
CHECKED BY SP Doel DATE 1FEB 06
SCALE Not to Scale No. MSK-3



* - EQUIPMENT BENEATH HOOD MAY VARY

KITCHEN HOOD KH-1 DETAILS

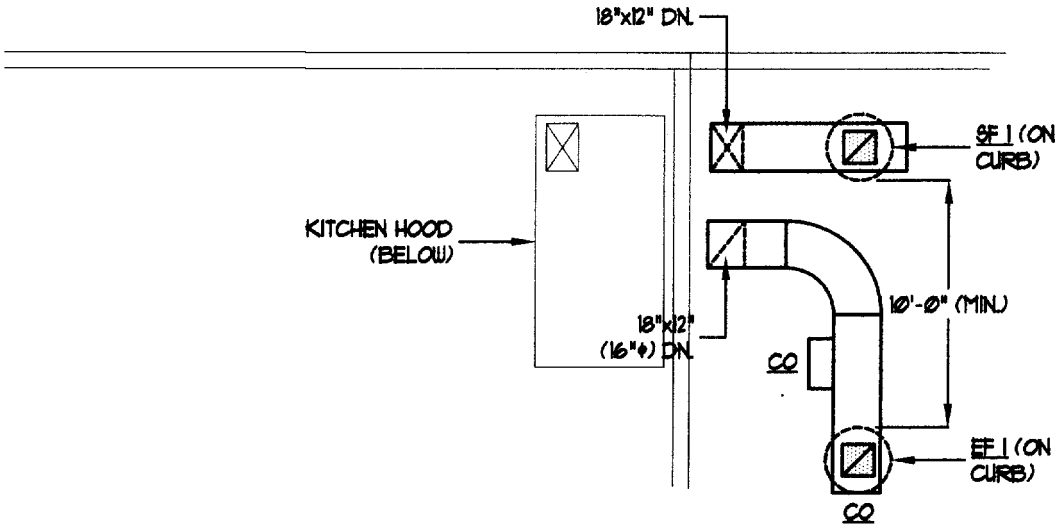
NTS



STATE OF MAINE
STEPHEN P. DOEL
No. 3807
REGISTERED PROFESSIONAL ENGINEER

BENNETT ENGINEERING
CONSULTI NG ENGI NEERS
BENNETT ROAD P.O. BOX 297
FREEPORT, MAINE 04032
(207) 865-9475

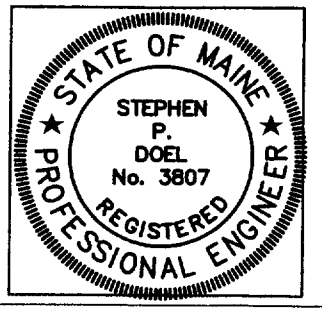
JOB K and D's, Portland, ME
DESIGNED BY SP Doel DATE 1 FEB 06
CHECKED BY SP Doel DATE 1 FEB 06
SCALE Not to Scale No. MSK-2



Partial Upper Level Plan

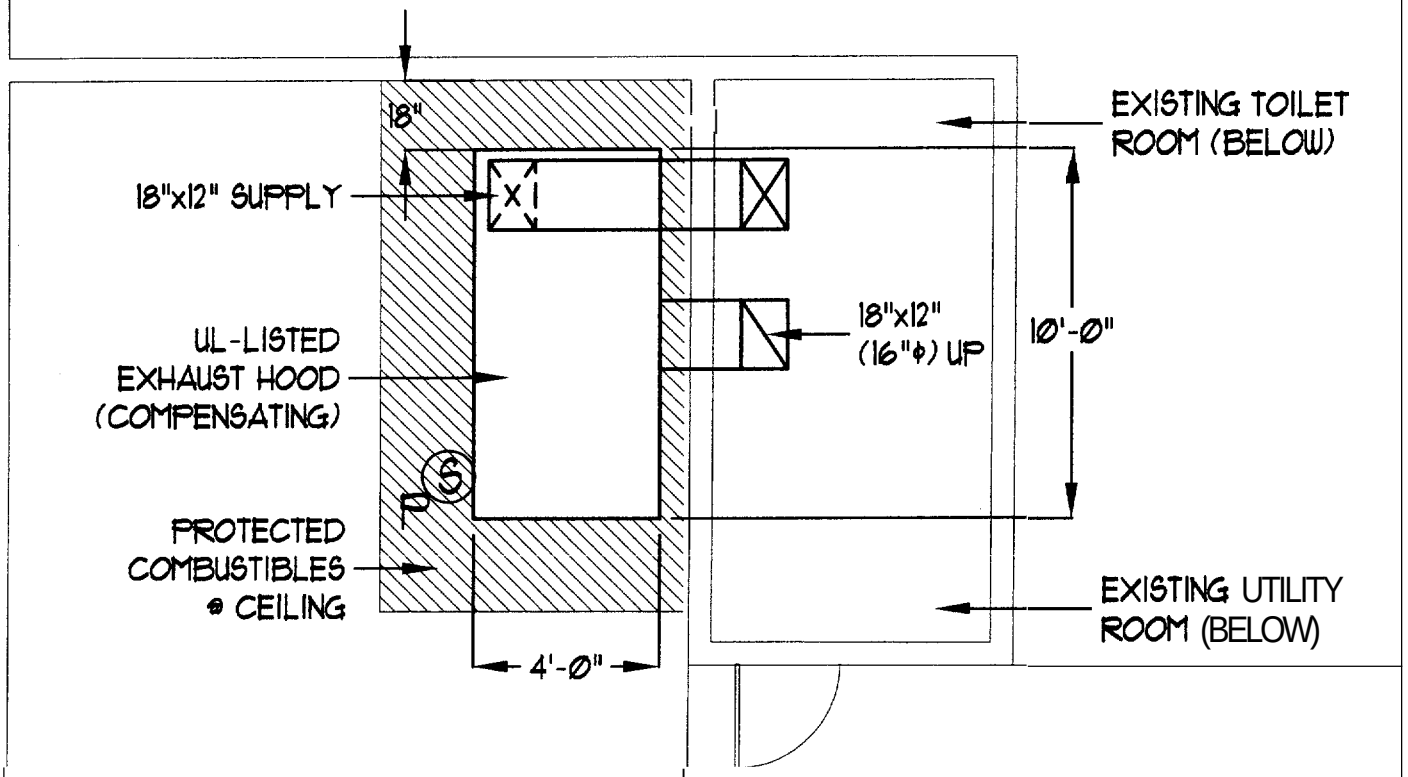
General Notes

1. The ceiling above and behind the hood and for 18" on all sides shall be protected in accordance with NFPA 96, for 3" minimum clearance to combustibles, as follows - Provide 22 gauge sheetmetal on 1" thick ceramic fiber insulation (3M "Firemaster", or approved equal). The insulation shall be held in place and reinforced with wire mesh, or equal. The sheetmetal assembly shall be supported by ceramic or other non-combustible spacers.
2. Supply air ductwork shall be 22 gauge galvanized steel with 1½" thick fiberglass ductwrap w/ ASJ by Knauf or Owens-Corning. The supply connection at the hood shall have a UL-listed fire damper.
3. The supply and exhaust fans shall have a minimum separation of 10'-0". The supply and exhaust fans shall be electrically interlocked. The exhaust fan shall be on an 18" high ventilated curb.



BENNETT ENGINEERING
CONSULTI NG ENGI NEERS
BENNETT ROAD P.O. BOX 297
FREEPORT, MAINE 04032
(207) 865-9475

JOB K and D's, Portland, ME
DESIGNED BY SP Doel DATE 1 FEB 06
CHECKED BY SP Doel DATE 1 FEB 06
SCALE Not to Scale No. MSK-1



Partial Plan @ Kitchen

STATE OF MAINE
STEPHEN P. DOEL
No. 3807
REGISTERED PROFESSIONAL ENGINEER

Commercial Interior & Change of Use Permit Application Checklist

All of the following information is required and must be submitted. Checking off each item as you prepare your application package will ensure your package is complete and will help to expedite the permitting process.

One (1) complete set of construction drawings must include:

Note: Construction documents for costs in excess of $50,000.00 must be prepared by a Design Professional and bear their seal.

- ☑ Cross sections w/framing details Exhibits A, B, C, D
- ☑ Detail of any new walls or permanent partitions Exhibits "A", "B"
- ☑ Floor plans and elevations SEE "FLOOR PLAN"
- ☐ Window and door schedules
- N/A Complete electrical and plumbing layout.
- ☑ Mechanical drawings for any specialized equipment such as furnaces, chimneys, gas equipment, HVAC equipment or other types of work that may require special review "KITCHEN HOOD SYSTEM"
- N/A Insulation R-factors of walls, ceilings, floors & U-factors of windows as per the IEEC 2003
- ☑ Proof of ownership is required if it is inconsistent with the assessors records.
- N/A Reduced plans or electronic files in PDF format are required if originals are larger than 11" x 17".

Separate permits are required for internal and external plumbing, HVAC & electrical installations.

For additions less than 500 sq. ft. or that does not affect parking or traffic, a site plan exemption should be filed including:

- ☐ The shape and dimension of the lot, footprint of the proposed structure and the distance from the actual property lines.
- ☐ Location and dimensions of parking areas and driveways, street spaces and building frontage

A Minor Site Plan Review is required for any change of use between 5,000 and 10,000 sq. ft. (cumulatively within a 3-year period)

Please submit all of the information outlined in this application checklist. If the application is incomplete, the application may be refused.

In order to be sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information visit us on-Line at www.portlandmaine.gov, stop by the Building Inspections office, room 315 City Hall or call 874-8703.

Permit Fee: $30.00 for the first $1000.00 construction cost, $9.00 per additional $1000.00 cost

This is not a Permit; you may not commence any work until the Permit is issued.

This page contains a detailed description of the Parcel ID you selected. Press the New Search button at the bottom of the screen to submit a new query.

Current Owner Information

Card Number	1 of 1
Parcel ID	032 V014001
Location	50 WHARF ST
Land Use	RETAIL & PERSONAL SERVICE
Owner Address	FORE & WHARF LLC 6 WEBBER WAY FALMOUTH ME 04105
Book/Page	19593/229
Legal	32-V-14 UNION ST 9-13 WHARF ST 46-54 8048 SF

OWNER of Property

Current Assessed Valuation For Fiscal Year 2006

Land	Building	Total
$324,960	$287,680	$612,640

Estimated Assessed Valuation For Fiscal Year 2007"

Land	Building	Total
$349,200	$456,800	$806,000

* **Value subject to change based upon review of property status as of 4/1/06. The tax rate will be determined by City Council in May 2006.**

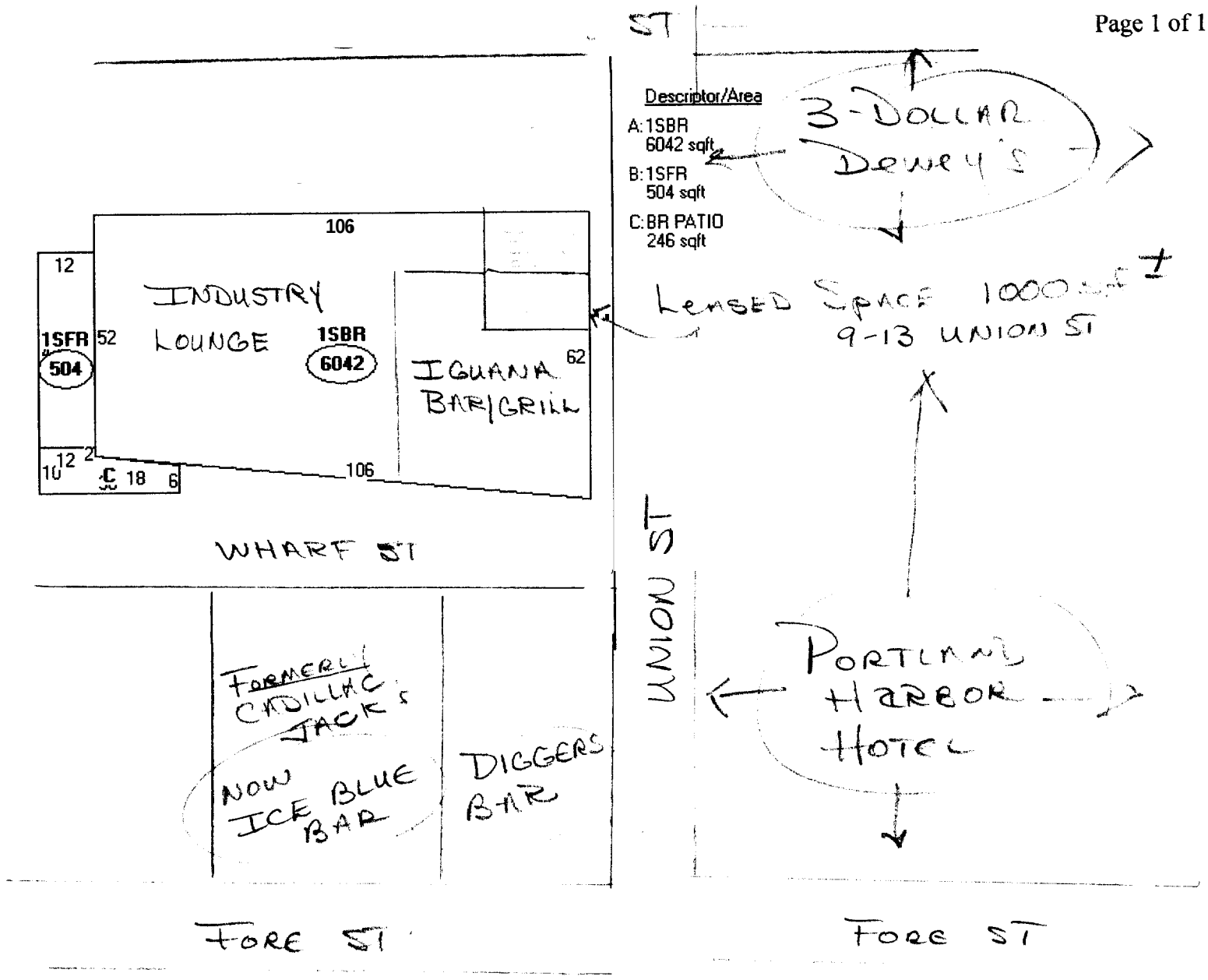
Building Information

Bldg #	Year Built	# Units	Bldg Sq. Ft.	Identical Units
1	1900	1	7146	1

Total Acres	Total Buildings Sq. Ft.	Structure Type	Building Name
0.185	7146	RESTAURANT	THE INDUSTRY / IGUANA TATOO

Exterior/Interior Information

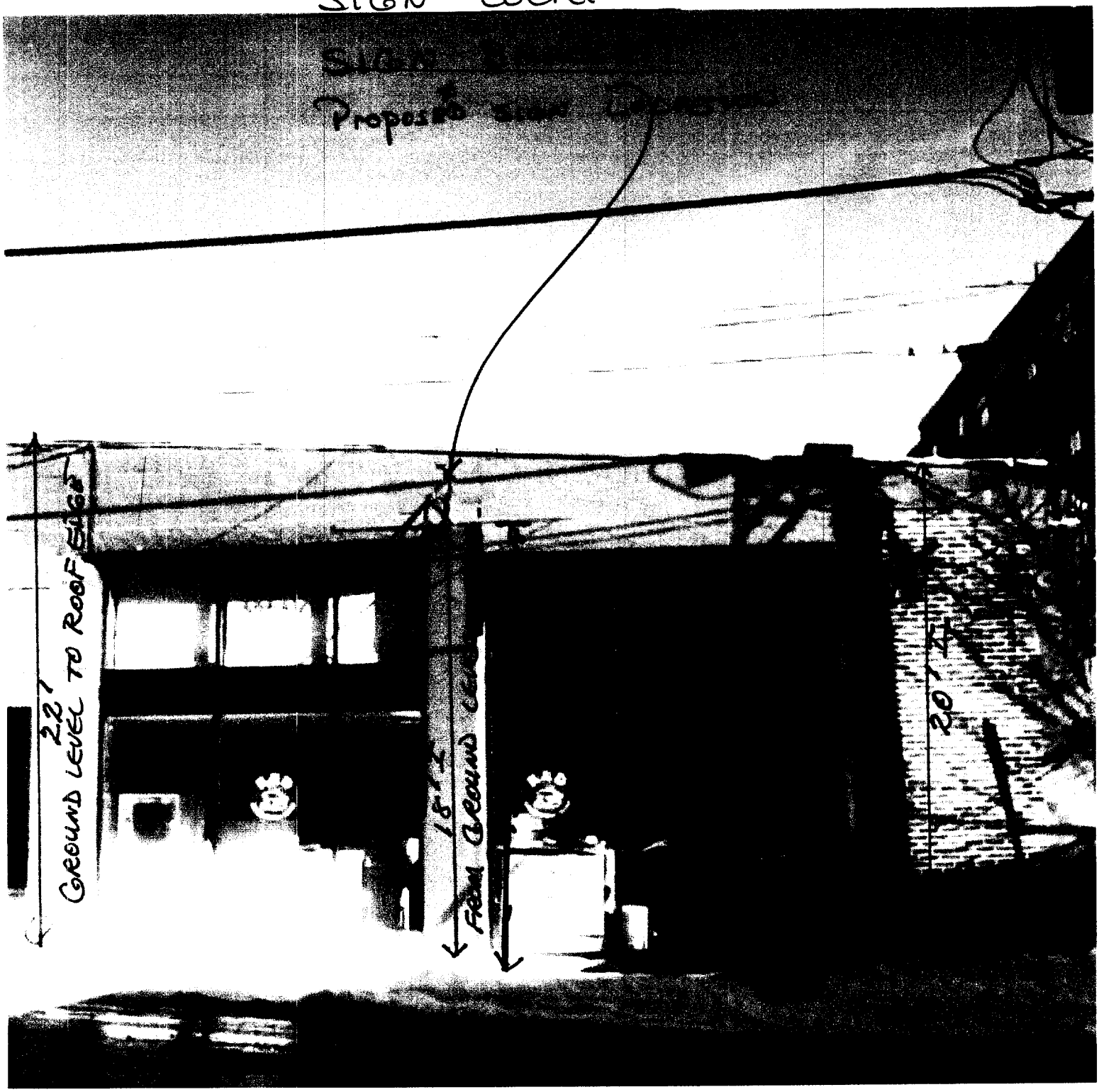
Section	Levels	Size	Use
1	01/01	3359	RESTAURANT
1	01/01	3187	BAR/LOUNGE
1	E1/E1	600	MULTI-USE SALES



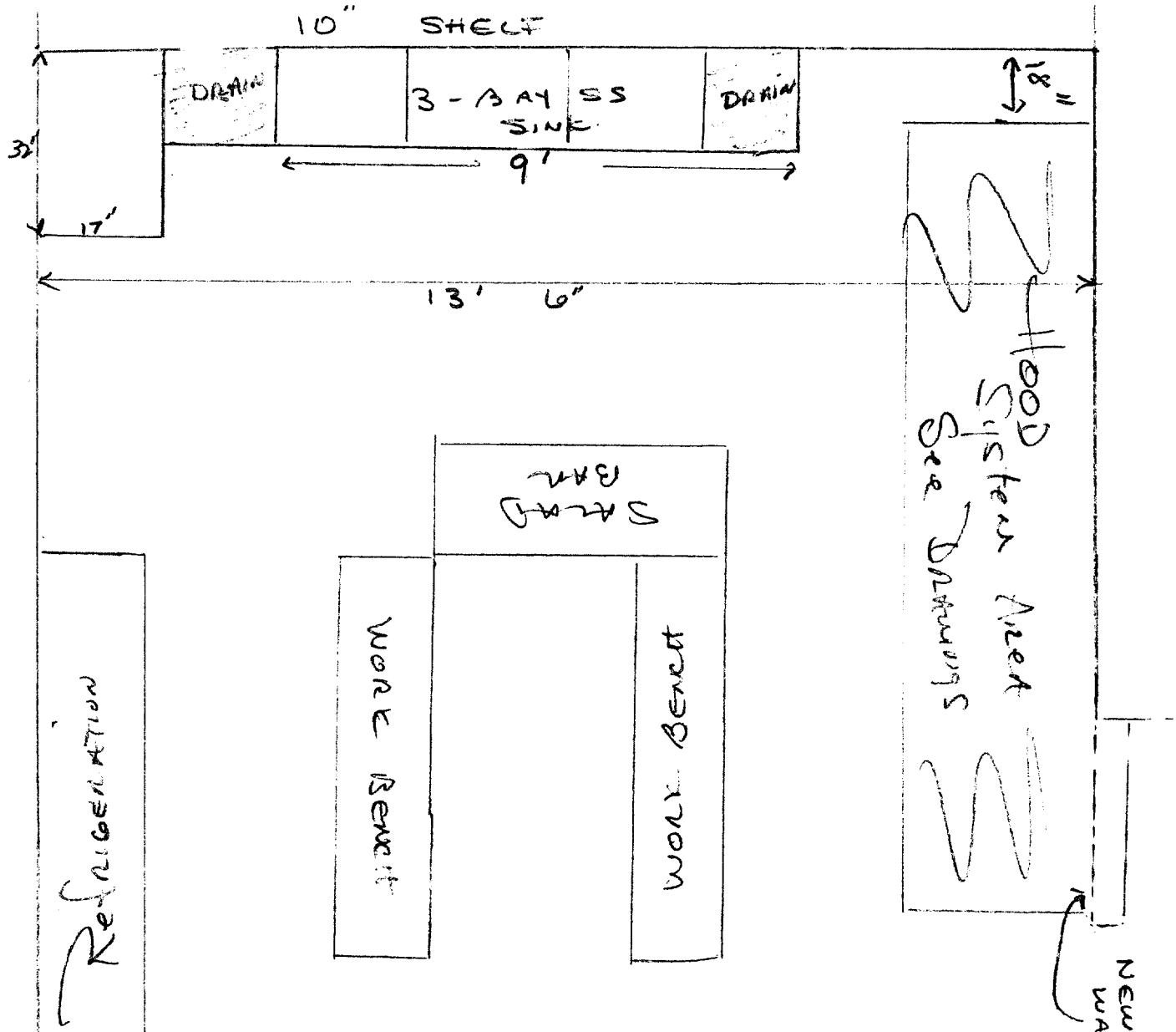
SITE PLAN SKETCH & Abutting Buildings / Businesses

CHIANG MAI
9-13 UNION ST

SIGN LOCATION



Proposed Area for Kitchen Exhaust Fan Installation on Roof.



"Floor Plan"

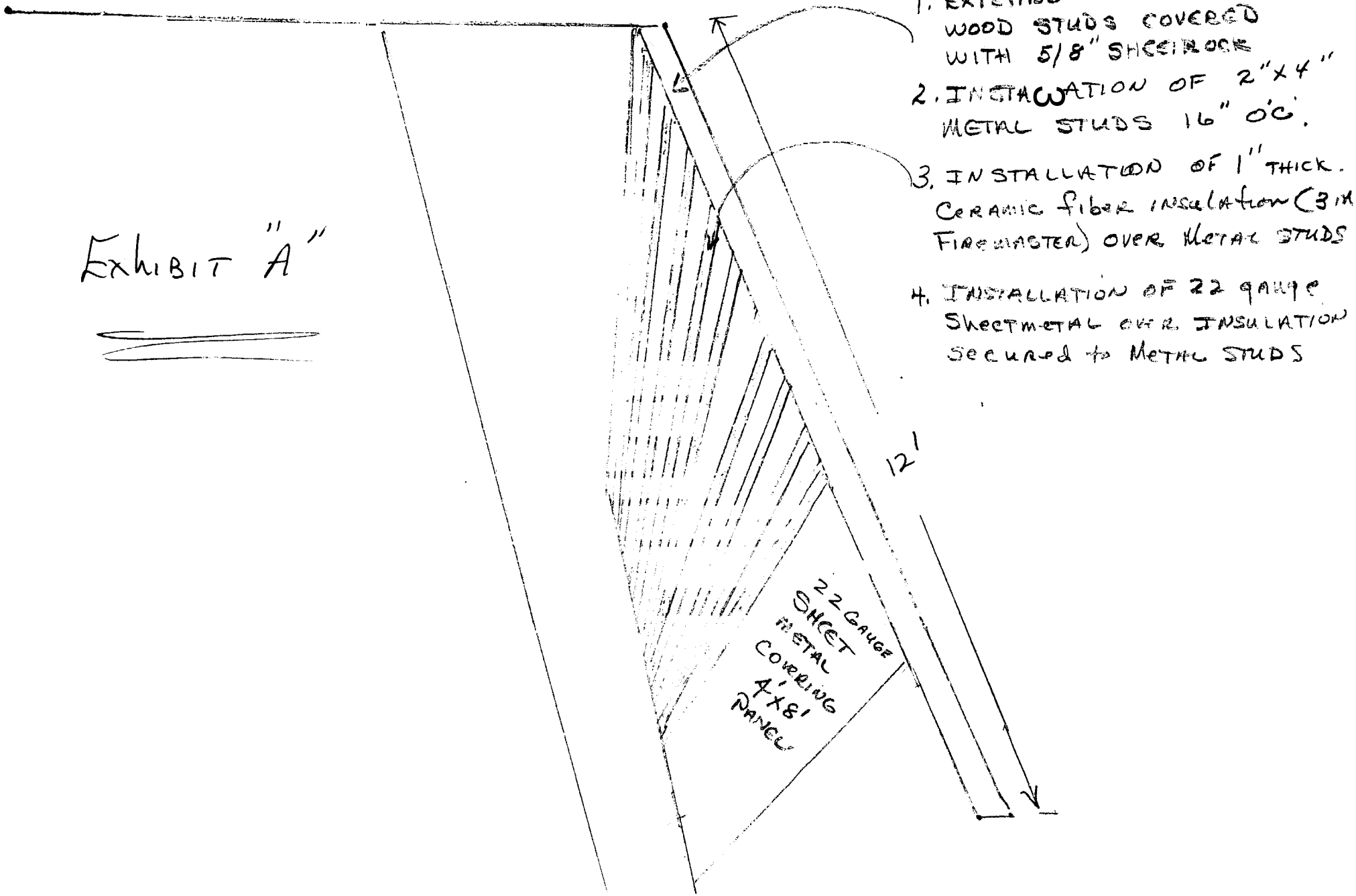
Proposed Kitchen Layout
9-13 Union St
Ftld, ME

Formerly K&D Sandwich Shop

CROSS SECTION W/ [illegible] E

REAR WALL OF HOOD EXHAUST SYSTEM

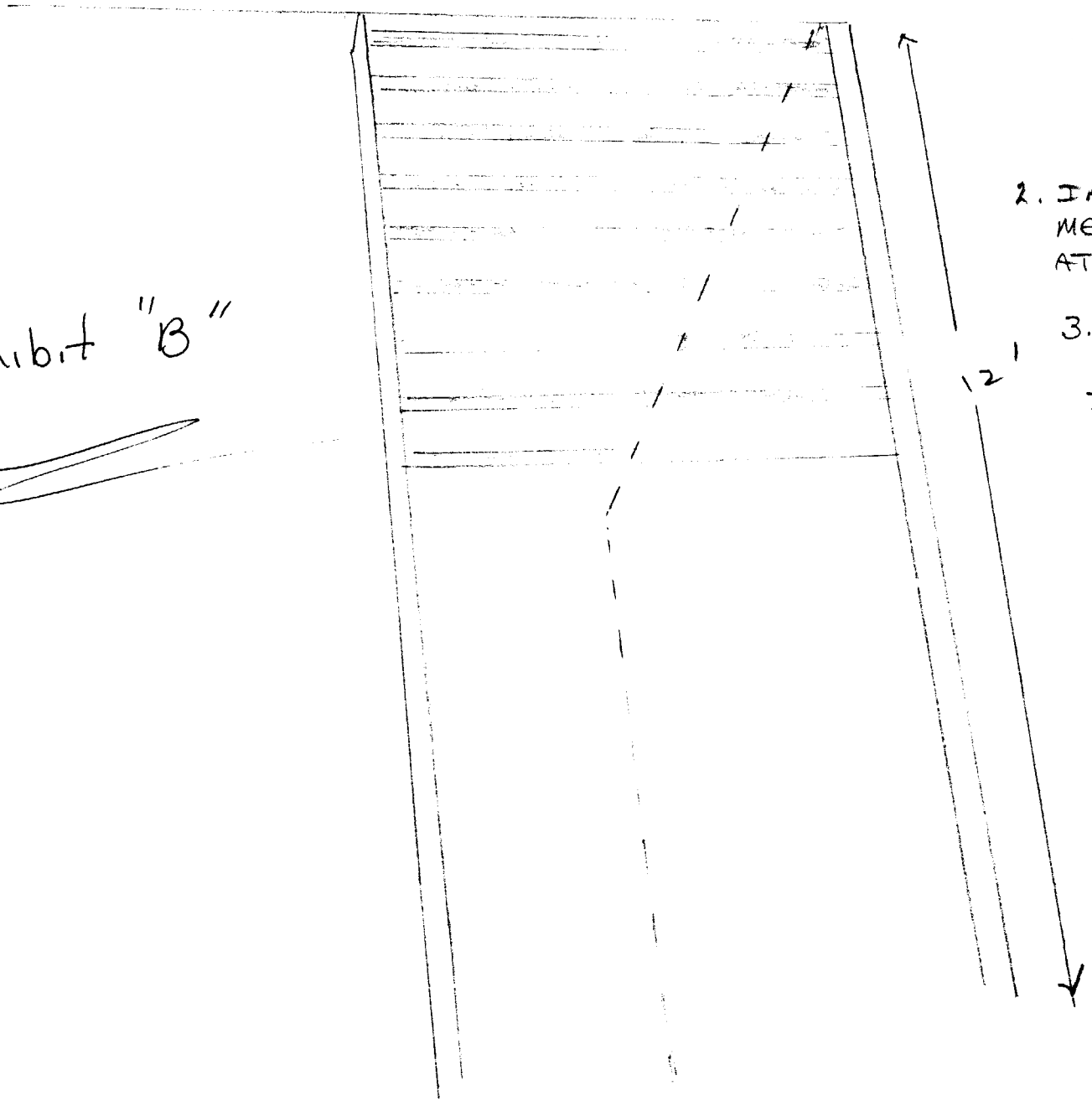
EXHIBIT "A"



CROSS SECTION OF CEILING (FRAMING DETAILS)

CEILING ABOVE HOOD EXHAUST SYSTEM

Exhibit "B"



2. INSTALLATION OF 2"x4" METAL STUDS ON CEILING AT 16" OC

3. INSTALLATION OF 1" THICK CERAMIC FIBER INSULATION (3M FIREMASTER) OVER METAL STUDS

4. INSTALLATION OF 22 GAUGE SHEETMETAL OVER INSULATION SECURED TO METAL STUDS

INTERIOR RAFTER LAYOUT

A. EXISTING 2x12" ROOF RAFTERS 16" OC

B. IF NEEDED FOR DUCT WORK OPENING, 1 RAFTER WILL BE CUT AN RAFTERS 1, 2, 3 WILL BE TIED TOGETHER WITH DOUBLE 2X12"S TO SUPPORT RAFTERS.

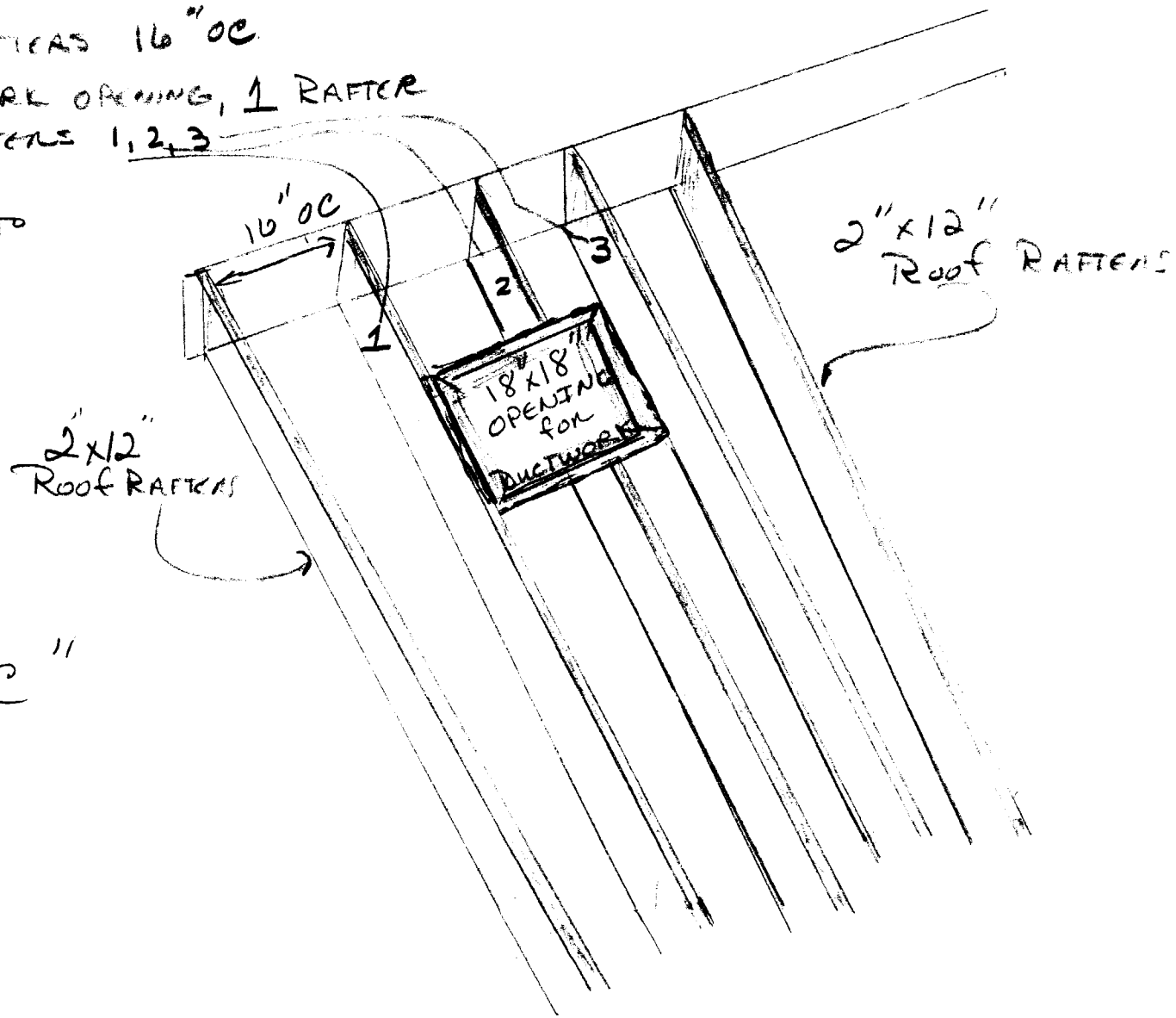


Exhibit "C"

PORTLAND MAINE
Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Lee Urban- Director of Planning and Development
Michael J. Nugent- Inspections Division Director

Kitchen Exhaust System Checklist and Code Provisions

Dear Applicant,

The following is a checklist to assist you in filing for a permit for a Kitchen Exhaust system. The applicable Mechanical Code provisions have also been attached. Please complete this and submit job specific construction documents that demonstrate compliance with the attached information.

Type of System:

Type I X Type II _____

(Type I systems are systems that vent fryers, grills, broilers, ovens or woks. Type II systems are systems that vent steamers and other non grease producing appliances)

Type of Materials:

Is the hood Stainless steel or other type of steel? STAINLESS If Other, what Type? _____

Is the duct work Stainless steel or other type of steel? _____ If Other, what type? MILD Steel 16 guage.

Thickness of the steel for the hood 16 guage

Thickness of the duct for the hood 16 guage

Type of Hood and Duct supports Grease Type Hood. with Grease TRAPS and cups for collection of exhaust. 3/8 Threaded Rod supports for Hood and Duct.

Type of seams and Joints WELDED Seams 100%

Grease Gutters provided? Yes

Hood Clearance from Combustibles materials 8"

Duct Clearance from Combustibles materials 3-M Fire WRAP Protection

~~Vibration Isolation System:~~ 3-M foam gasket Applied To Roof curb for fan unit

Air Velocity within the duct system 2800 cfm @ .75 STATIC pressure

Grease accumulation prevention system grease filters in Hood with grease cups.

Cleanouts 12"x12" cleanouts at each elbow in Duct

Grease Duct enclosure Fire Master Duct wrap

Exhaust Termination Roof

Fire Suppression system Mechanical AAA

Exhaust fan mounting and clearance from the roof or wall 10' from outside wall on top of Roof

Exhaust fan distance from other vents or openings 10'

Exhaust fan height above adjoining grade 18"

Hood Specs

Style of hood Grease Hood canopy

Type of Filter: 6 Grease filter

Height of filter above nearest cooking surface: 6'6"

Capacity of hood in CFM 2800

Make up Air system description and capacity 2350 cfm Make up Air

SECTION 506
COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT

506.1 General. Commercial kitchen hood ventilation ducts and exhaust equipment shall comply with the requirements of this section. Commercial kitchen grease ducts shall be designed for the type of cooking appliance and hood served.

506.2 Corrosion protection. Ducts exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an approved manner.

506.3 Ducts serving Type I **hoods.** Type I exhaust ducts shall be independent of all other exhaust systems except as provided in Section 506.3.5. Commercial kitchen duct systems serving Type I **hoods** shall be designed; constructed and installed in accordance with Sections 506.3.1 through 506.3.12.3.

5063.1 Duct materials. Ducts serving Type I hoods shall be constructed of materials in accordance with Sections 506.3.1.1 and 506.3.1.2.

506.3.1.1 Grease duct materials. Grease ducts serving Type I hoods shall be constructed of steel not less than 0.055 inch (1.4 mm) (No. 16 Gage) in thickness or stainless steel not less than 0.044 inch (1.1 mm) (No. 18 Gage) in thickness.

Exception: Listed and labeled factory-built commercial kitchen grease ducts shall be installed in accordance with Section 304.1.

506.3.1.2 Makeup **air** ducts. Make up air ducts connecting to or within 18 inches **(457** mm) of a Type I hood shall be constructed and installed in accordance with Sections 603.1, 603.3, 603.4, 603.9, 603.10 and 603.12. Duct insulation installed within 18 inches (457 mm) of a Type I hood shall be noncombustible or shall be listed for the application.

Exceptions:

1. Penetrations shall not be required to be welded or brazed where sealed by devices that are listed for the application.
2. Internal welding or brazing shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection.
3. Listed and labeled factory-built commercial kitchen grease ducts installed in accordance with Section 304.1.

506.3.2.1 Duct joint types. Duct joints shall be butt joints or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 0.25 inch (6 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).

506.3.2.2 Duct-to-hood joints. Duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, accessible for inspection, and without grease traps.

Exceptions: This section shall not apply to:

1. **A** vertical duct-to-hood collar connection made in the top plane of the hood in accordance with all of the following:
   1.1. The hood duct opening shall have a 1-inch-deep (25 mm), full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees from the plane of the opening.
   1.2. The duct shall have a 1-inch-deep (25 mm) flange made by a 1-inch by 1-inch (25 mm by 25 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25 mm) above the bottom end of the duct.
   1.3. **A** gasket rated for use at not less than 1,500°F (815°C) is installed between the duct flange and the top of the hood.
   1.4. The duct-to-hood joint shall be secured by stud bolts not less than 0.25 inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. *All* bolts and nuts are to be secured with lockwashers.
2. Listed and labeled duct-to-hood collar connections installed in accordance with Section 304.1.

506.3.2.3 Duct-to-exhaust fan connections. Duct-to-exhaust fan connections shall be flanged and gasketed at the base of the fan for vertical discharge fans; shall be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and shall be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans.

506.3.2.4 Vibration isolation. **A** vibration isolation connector for connecting a duct to a fan shall consist of noncombustible packing in a metal sleeve joint of approved design or shall be a coated-fabric flexible duct connector listed and labeled for the application. Vibration isolation connectors shall be installed only at the connection of a duct to a fan inlet or outlet.

506.3.3 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code.* Bolts, screws, rivets and other mechanical fasteners shall not penetrate duct walls.

506.3.4 Air velocity. Grease duct systems serving a Type I hood shall be designed and installed to provide an air velocity within the duct system of not less than 1,500 feet per minute (7.6 m/s).

Exception: The velocity limitations shall not apply within duct transitions utilized to connect ducts to differently

sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.

506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. A separate grease duct system is not required where all of the following conditions are met:

1. All interconnected hoods are located within the same story.
2. All interconnected hoods are located within the same room or in adjoining rooms.
3. Interconnecting ducts do not penetrate assemblies required to be fire-resistance rated.
4. The grease duct system does not serve solid fuel-fired appliances.

506.3.6 Grease duct clearances. Grease duct systems and exhaust equipment serving a Type I hood shall have a clearance to combustible construction of not less than 18 inches (457 mm), and shall have a clearance to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 3 inches (76 mm).

Exception: Listed and labeled factory-built commercial kitchen grease ducts and exhaust equipment installed in accordance with Section 304.1.

506.3.7 Prevention of grease accumulation in grease ducts. Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in **12** units horizontal (2-percent slope) toward the hood or toward an approved grease reservoir. Where horizontal ducts exceed 75 feet (22 860 mm) in length, the slope shall not be less than one unit vertical in 12 units horizontal (8.3-percent slope).

506.3.8 Grease duct cleanouts and other openings. Grease duct systems shall not have openings therein other than those required for proper operation and maintenance of the system. Any portion of such system having sections not provided with access from the duct entry or discharge shall be provided with cleanout openings. Cleanout openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the duct. Doors shall be equipped with a substantial method of latching, sufficient to hold the door tightly closed. Doors shall be designed so that they are operable without the use of a tool. Door assemblies, including any frames and gasketing, shall be approved for the purpose, and shall not have fasteners that penetrate the duct. Listed and labeled access door assemblies shall be installed in accordance with the terms of the listing.

506.3.8.1 Personnel entry. Where ductwork is large enough to allow entry of personnel, not less than one approved or listed opening having dimensions not less than 20 inches by 20 inches (508 mm by 508 mm) shall be provided in the horizontal sections, and in the top of vertical risers. Where such entry is provided, the duct and its supports shall be capable of supporting the additional load and the cleanouts specified in Section 506.3.8 are not required.

506.3.9 Grease duct horizontal cleanouts. Cleanouts located on horizontal sections of ducts shall be spaced not more than 20 feet (6096 mm) apart. The cleanouts shall be located on the side of the duct with the opening not less than 1.5 inches (38 mm) above the bottom of the duct, and not less than 1 inch (25 mm) below the top of the duct. The opening minimum dimensions shall be 12 inches (305 mm) on each side. Where the dimensions of the side of the duct prohibit the cleanout installation prescribed herein, the openings shall be on the top of the duct or the bottom of the duct. Where located on the top of the duct, the opening edges shall be a minimum of 1 inch (25 mm) from the edges of the duct. Where located in the bottom of the duct, cleanout openings shall be designed to provide internal damming around the opening, shall be provided with gasketing to preclude grease leakage, shall provide for drainage of grease down the duct around the dam, and shall be approved for the application. Where the dimensions of the sides, top or bottom of the duct preclude the installation of the prescribed minimum-size cleanout opening, the cleanout shall be located on the duct face that affords the largest opening dimension and shall be installed with the opening edges at the prescribed distances from the duct edges as previously set forth in this section.

506.3.10 Grease duct enclosure. A grease duct serving a Type I hood that penetrates a ceiling, wall or floor shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. Ducts shall be enclosed in accordance with the *International Building Code* requirements for shaft construction. The duct enclosure shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings. Clearance from the duct to the interior surface of enclosures of combustible construction shall be not less than 18 inches (457 mm). Clearance from the duct to the interior surface of enclosures of noncombustible construction or gypsum wallboard attached to noncombustible structures shall be not less than 6 inches (152 mm). The duct enclosure shall serve a single grease exhaust duct system and shall not contain any other ducts, piping, wiring or systems.

Exceptions:

1. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where the surface of the duct is continuously covered on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and labeled material, system, method of construction or product specifically evaluated for such purpose, in accordance with a nationally recognized standard for such enclosure materials. Exposed duct wrap systems shall be protected where subject to physical damage.
2. **A** duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

506.3.11 Grease duct fire-resistive access opening. Where cleanout openings are located in ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An approved sign shall be placed on access opening panels with wording as follows: "ACCESS PANEL. DO NOT OBSTRUCT."

506.3.12 Exhaust outlets serving Type **I hoods.** Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.12.1 through 506.3.12.3.

506.3.12.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.

506.3.12.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors, and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located where protected openings are required by the International Building Code. Other exterior openings shall not be located within 3 feet (914 mm) of such terminations.

506.3.12.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent property lines and air intake openings into any building and shall be located not less than 10 feet (3048 mm) above the adjoining grade level.

Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) from an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.

506.4 Ducts serving Type II hoods. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.

506.4.1 Type II exhaust outlets. Exhaust outlets for ducts serving Type II hoods shall comply with Sections 401.5 and 401.5.2. Such outlets shall be protected against local weather conditions and shall meet the provisions for exterior wall opening protectives in accordance with the International Building Code.

506.4.2 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an approved manner.

506.5 Exhaust equipment. Exhaust equipment, including fans and grease reservoirs, shall comply with Section 506.5.1 through 506.5.5 and shall be of an approved design or shall be listed for the application.

506.5.1 Exhaust fans. Exhaust fan housings serving a Type I hood shall be constructed as required for grease ducts in accordance with Section 506.3.1.1.

Exception: Fans listed and labeled in accordance with UL 762.

506.5.1.1 Fan motor. Exhaust fan motors shall be located outside of the exhaust airstream.

506.5.2 Exhaust fan discharge. Exhaust fans shall be positioned so that the discharge will not impinge on the roof, other equipment or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an approved drain outlet at the lowest point of the housing to permit drainage of grease to an approved grease reservoir.

506.5.3 Exhaust fan mounting. An upblast fan shall be hinged and supplied with a flexible weatherproof electrical cable to permit inspection and cleaning. The ductwork shall extend a minimum of 18 inches (457 mm) above the roof surface.

506.5.4 Clearances. Exhaust equipment serving a Type I hood shall have a clearance to combustible construction of not less than 18 inches (457 mm).

Exception: Factory-built exhaust equipment installed in accordance with Section 304.1 and listed for a lesser clearance.

506.5.5 Termination location. The outlet of exhaust equipment serving Type I hoods, shall be in accordance with Section 506.3.12.3

Exception: The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm) provided that such structures are not higher than the top of the fan discharge opening.

SECTION *507*
COMMERCIAL KITCHEN HOODS

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or Type II and shall be designed to capture and confine cooking vapors and residues.

Exceptions:

1. Factory-built commercial exhaust hoods which are tested in accordance with UL 710, listed, labeled and installed in accordance with Section 304.1 shall not be required to comply with Sections 507.4, 507.7, 507.11, 507.12, 507.13, 507.14 and 507.15.
2. Factory-built commercial cooking recirculating systems which are tested in accordance with UL 197, listed, labeled and installed in accordance with Section 304.1 shall not be required to comply with Sections 507.4, 507.5, 507.7, 507.12, 507.13, 507.14 and 507.15.
3. Net exhaust volumes for hoods shall be permitted to be reduced during no-load cooking conditions, where

installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces.

507.11.2 Mounting position. Filters shall be installed at an angle of not less than 45 degrees (0.79 rad) from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters.

507.12 Canopy size and location. The inside lower edge of canopy-type commercial cooking hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the cooking surface, on all open sides. The vertical distance between the front lower lip of the hood and the cooking surface shall not exceed 4 feet (1219 mm).

Exception: The hood shall be permitted to be flush with the outer edge of the cooking surface where the hood is closed to the appliance side by a noncombustible wall or panel.

507.13 Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections **507.13.1** through **507.13.4.** The net quantity of exhaust air shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of extra-heavy-duty, heavy-duty, medium-duty, and light-duty cooking appliances are utilized under a single hood, the highest exhaust rate required by this section shall be used for the entire hood.

507.13.1 Extra-heavy-duty cooking appliances. The minimum net airflow for Type I hoods used for extra-heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Wall-mounted canopy	550
Single island canopy	700
Double island canopy (per side)	550
Backshelf/pass-over	Not allowed
Eyebrow	Not allowed

For SI: 1 cfm per linear foot = 1.55 Us per linear meter.

507.13.2 Heavy-duty cooking appliances. The minimum net airflow for Type I hoods used for heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Wall-mounted canopy	400
Single island canopy	600
Double island canopy (per side)	400
Backshelf/pass-over	400
Eyebrow	Not allowed

For SI: 1 cfm per linear foot = 1.55 Us per linear meter.

507.13.3 Medium-duty cooking appliances. The minimum net airflow for Type I hoods used for medium-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Wall-mounted canopy	300
Single island canopy	500
Double island canopy (per side)	300
Backshelf/pass-over	300
Eyebrow	250

For SI: 1 cfm per linear foot = 1.55 Us per linear meter.

507.13.4 Light-duty cooking appliances. The minimum net airflow for Type I hoods used for light duty cooking appliances and food service preparation and cooking operations approved for use under a Type II hood shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Wall-mounted canopy	200
Single island canopy	400
Double island canopy (per side)	250
Backshelf/pass-over	250
Eyebrow	250

For SI: 1 cfm per linear foot = 1.55 Us per linear meter.

507.14 Noncanopy size and location. Noncanopy-type hoods shall be located a maximum of 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back a maximum of 1 foot (305 mm) from the edge of the cooking surface.

507.15 Exhaust outlets. Exhaust outlets located within the hood shall be located so as to optimize the capture of particulate matter. Each outlet shall serve not more than a 12-foot (3658 mm) section of hood.

507.16 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving commercial cooking appliances. The test shall verify the rate of exhaust airflow required by Section 507.13, makeup airflow required by Section 508, and proper operation as specified in this chapter. The permit holder shall furnish the necessary test equipment and devices required to perform the tests.

507.16.1 Capture and containment test. The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as with smoke candles, smoke puffers, etc.

SECTION 508
COMMERCIAL KITCHEN MAKEUP AIR

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial cooking appliances. The amount of

makeup air supplied shall be approximately equal to the amount of exhaust air, The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. For mechanical makeup air systems, the exhaust and makeup air systems shall be electrically interlocked to insure that makeup air is provided whenever the exhaust system is in operation. Makeup air intake opening locations shall comply with Sections 401.5 and 401.5.1.

508.1.1 Makeup air temperature. The temperature differential between makeup air and the air in the conditioned space shall not exceed 10°F(6°C).

Exceptions:

1. Makeup air that is part of the air-conditioning system.
2. Makeup air that does not decrease the comfort conditions of the occupied space.

508.2 Compensating hoods. Manufacturers of compensating hoods shall provide a label indicating minimum exhaust flow and/or maximum makeup airflow that provides capture and containment of the exhaust effluent.

SECTION 509
FIRE SUPPRESSION SYSTEMS

509.1 Where required. Commercial cooking appliances required by Section 507.2.1 to have a Type I hood shall be provided with an approved automatic fire suppression system complying with the *International Building Code* and the *International Fire Code*.

SECTION 510
HAZARDOUS EXHAUST SYSTEMS

510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health-hazard rating of materials shall be as specified in NFPA 704.

510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

[F] 510.2.1 Lumber yards and woodworking facilities. Equipment or machinery located inside buildings at lumber yards and woodworking facilities which generates or emits combustible dust shall be provided with an approved dust-collection and exhaust system installed in conformance with this section and the *International Fire Code*. Equipment and systems that are used to collect, process or convey combustible dusts shall be provided with an approved explosion-control system.

[F] 510.2.2 Combustible fibers. Equipment or machinery within a building which generates or emits combustible fibers shall be provided with an approved dust-collecting and exhaust system. Such systems shall comply with this code and the *International Fire Code*.

510.3 Design and operation. The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit.

510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems. Incompatible materials, as defined in the *International Fire Code*, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

Contaminated air shall not be recirculated to occupied areas unless the contaminants have been removed. Air contaminated with explosive or flammable vapors, fumes or dusts; flammable or toxic gases; or radioactive material shall not be recirculated.

510.5 Design. Systems for removal of vapors, gases and smoke shall be designed by the constant velocity or equal friction methods. Systems conveying particulate matter shall be designed employing the constant velocity method.

510.5.1 Balancing. Systems conveying explosive or radioactive materials shall be prebalanced by duct sizing. Other systems shall be balanced by duct sizing with balancing devices, such as dampers. Dampers provided to balance airflow shall be provided with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.

510.5.2 Emission control. The design of the system shall be such that the emissions are confined to the area in which they are generated by air currents, hoods or enclosures and shall be exhausted by a duct system to a safe location or treated by removing contaminants.

510.5.3 Hoods required. Hoods or enclosures shall be used where contaminants originate in a limited area of a space. The design of the hood or enclosure shall be such that air currents created by the exhaust systems will capture the contaminants and transport them directly to the exhaust duct.