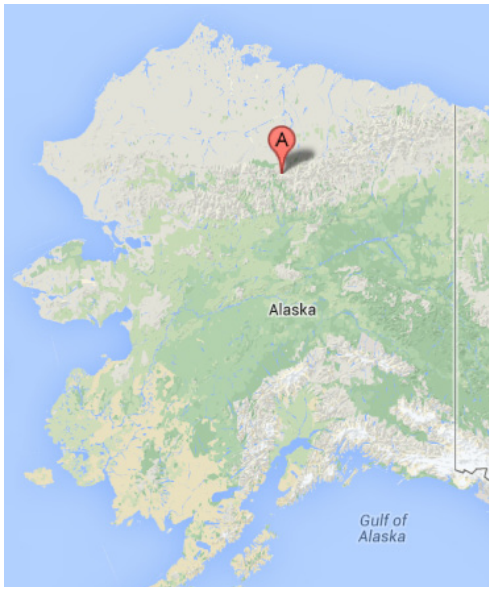
COLD CLIMATE HOUSING RESEARCH CENTER

CCHRC

# Design for Anaktuvuk Pass, Alaska

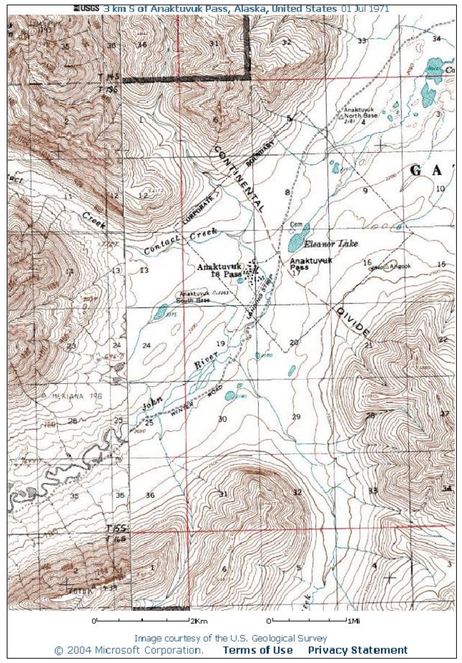
## spray foam envelope on foam insulated raft foundation



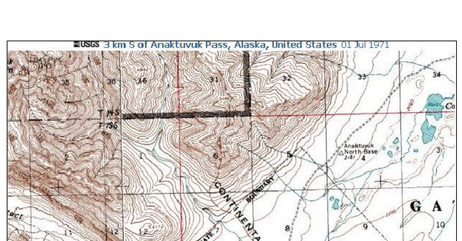

NOTE: The information contained in these documents was developed and published as a reference for specific climatic and site conditions. These documents are not a substitute for a detailed architectural plan set or site-specific engineering.

Any application of knowledge contained in this manual will need to consider site-specific issues including but not limited to applicable codes and structural design considerations for soil type, weather, and wind and snow load conditions. It is essential that a structural engineer review the plans to ensure they meet design criteria appropriate to the site.

This home has many elements that require specialized knowledge. We strongly recommend that skilled tasks, plumbing and electric work be done by professionals.




TOPOGRAPHIC MAP OF ANAKTUVUK PASS



NORTH AERIAL VIEW OF PROTOTYPE HOUSE



SOUTH AERIAL VIEW OF PROTOTYPE HOUSE

SATELLITE VIEW OF ANAKTUVUK PASS

## LIST OF DRAWINGS


A0.0 COVER SHEET
A0.1 GENERAL NOTES, SPECIFICATIONS
A1.1 FIRST FLOOR PLAN
A1.2 FRAMING PLANS
A2.1 BUILDING ELEVATIONS
A3.1 BUILDING SECTIONS, WALL SECTIONS, AND DETAILS
A3.2 WALL SECTIONS AND DETAILS
A3.3 EARTH BERM DETAILS
E1.1 ELECTRICAL LIGHTING LAYOUT
M1 MECHANICAL VENTILATION PLAN
M2 MECHANICAL VENTILATION ELEVATION

# ANAKTUVUK PASS PROTOTYPE HOUSE

DESIGNED WITH: THE RESIDENTS OF ANAKTUVUK PASS,
BY: HEBERT, COOKE, GRUNAU
DRAWN BY: JJG, KS
General Notes

| No. | Rev./Issue | Date |
|---|---|---|
| | | |
| | | |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CCHRC
1000 FAIRBANKS STREET
P.O. BOX 82489
FAIRBANKS, AK 99708-2489
(907) 457-3454
www.cchrc.org


PROJECT
**SUSTAINABLE NORTHERN SHELTER**
ANAKTUVIK PASS PROTOTYPE HOUSE
ANAKTUVUK PASS, ALASKA
ISSUED
14 JUNE 2009
CONSTRUCTION DOCUMENTS

COVER SHEET

A0.0

SHEET 1 OF 11

## SCHEDULES

### WINDOW SCHEDULE

| LABEL | TYPE | WIDTH | HEIGHT | FRAME TYPE | HINGE |
|---|---|---|---|---|---|
| A | VINYL | 2'-6" | 3'-6" | CASEMENT | |
| B | VINYL | 7'-6" | 3'-6" | CASEMENT/ PICTURE | |
| C | VINYL | 2'-6" | 2'-6" | CASEMENT | |
| D | VINYL | 1'-6" | 2'-6" | CASEMENT | |

### DOOR SCHEDULE

| DOOR NO. | ELEVATION | TYPE | WIDTH | HEIGHT | FRAME TYPE | HINGE |
|---|---|---|---|---|---|---|
| 1 | | FIBERGLASS | 3'-0" | 6'-8" | | LEFT |
| 2 | | STEEL | 3'-0" | 6'-8" | | LEFT |
| 3 | | WOOD | 2'-6" | 6'-8" | | RIGHT |
| 4 | | WOOD | 2'-8" | 6'-8" | | LEFT |
| 5 | | WOOD | 2'-8" | 6'-8" | | RIGHT |
| 6 | | WOOD | 2'-8" | 6'-8" | | RIGHT |

### PLUMBING FIXTURE SCHEDULE

| FIXTURE | MANUF. | PRODUCT NO. | FINISH | | |
|---|---|---|---|---|---|
| TOILET | | | | | |
| URINAL | | | | | |
| LAVORATORY | | | | | |
| LAV. FAUCET | | | | | |
| BATH | | | | | |
| SHOWER HEAD | | | | | |
| WASHER | | | | | |
| DRYER | | | | | |
| KITCHEN SINK | | | | | |
| KITCH. FAUCET | | | | | |

### TOILET ACCESSORY SCHEDULE

| ITEM | MANUF. | FINISH | MOUNTING HEIGHT | SIZE | REMARKS |
|---|---|---|---|---|---|
| TP DISPENSER | | | | | |
| MIRROR | | | | | |
| 24" TOWEL ROD | | | | | |
| SHOWER ROD | | | | | |

### FINISH SCHEDULE

| ROOM NAME & NO. | FLOOR | BASE BOARD | WALLS | CEILING | REMARKS |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
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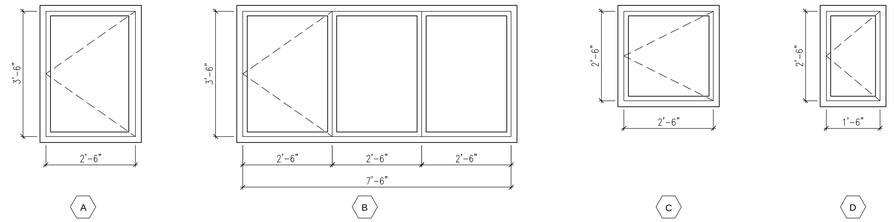
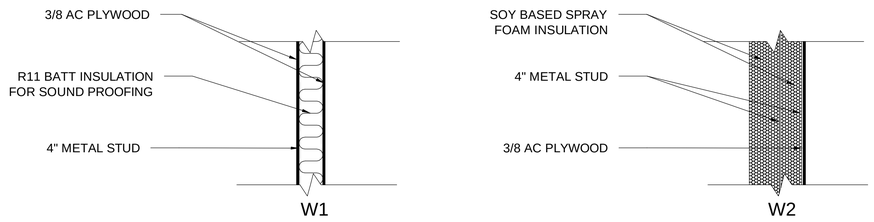
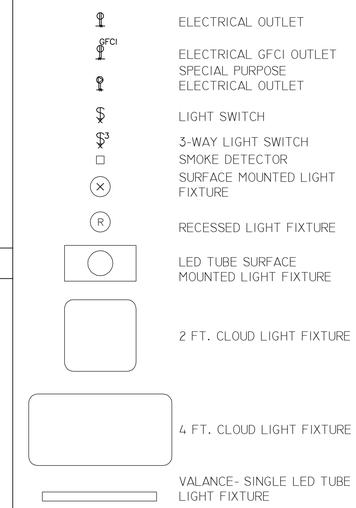
## WINDOW ELEVATIONS




## WALL TYPES




## ELECTRICAL SYMBOLS

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ANAKTUVIK PASS PROTOTYPE HOUSE

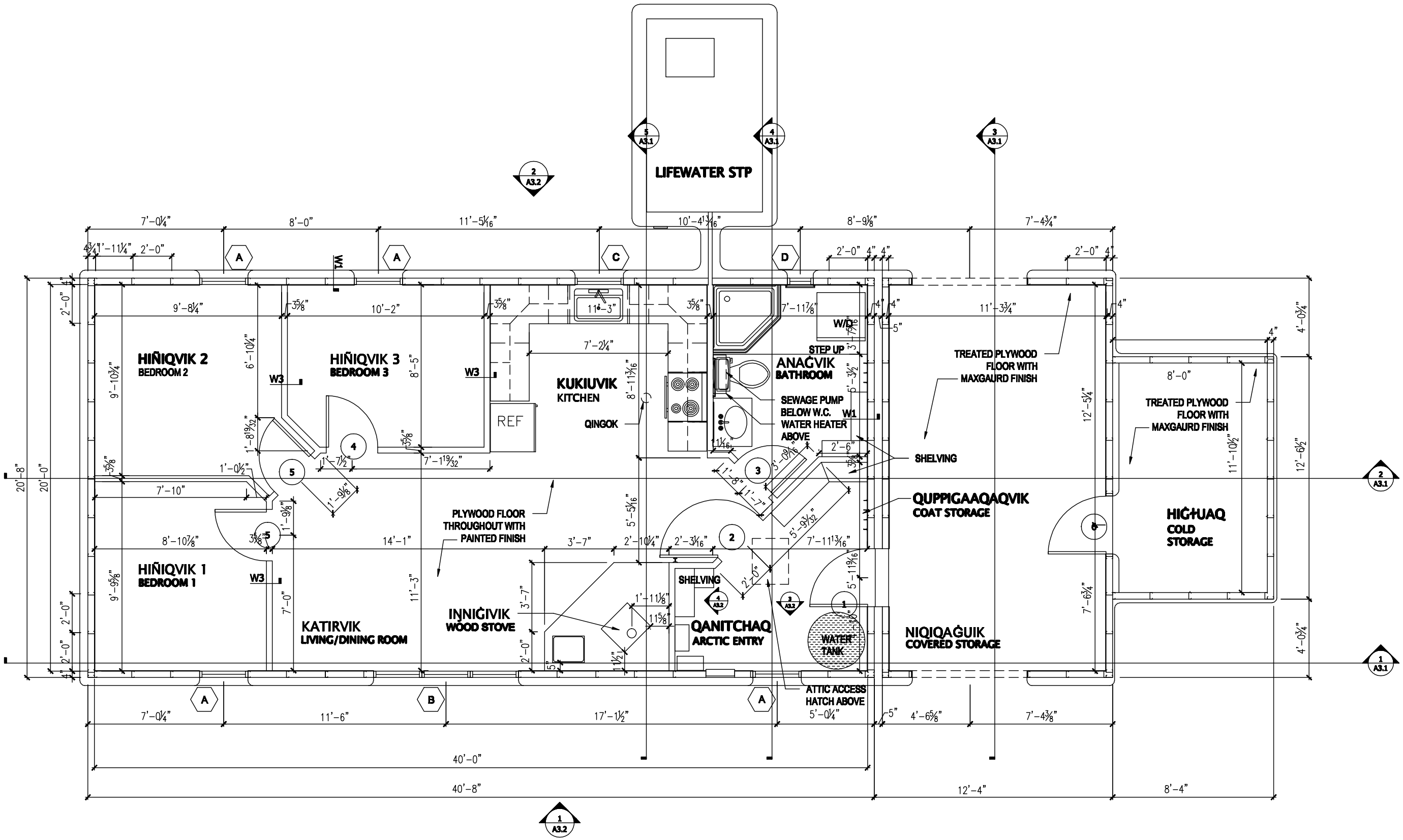
ANAKTUVUK PASS, ALASKA

ISSUED
14 JUNE 2009
CONSTRUCTION DOCUMENTS

SPECIFICATIONS AND GENERAL CONSTRUCTION NOTES

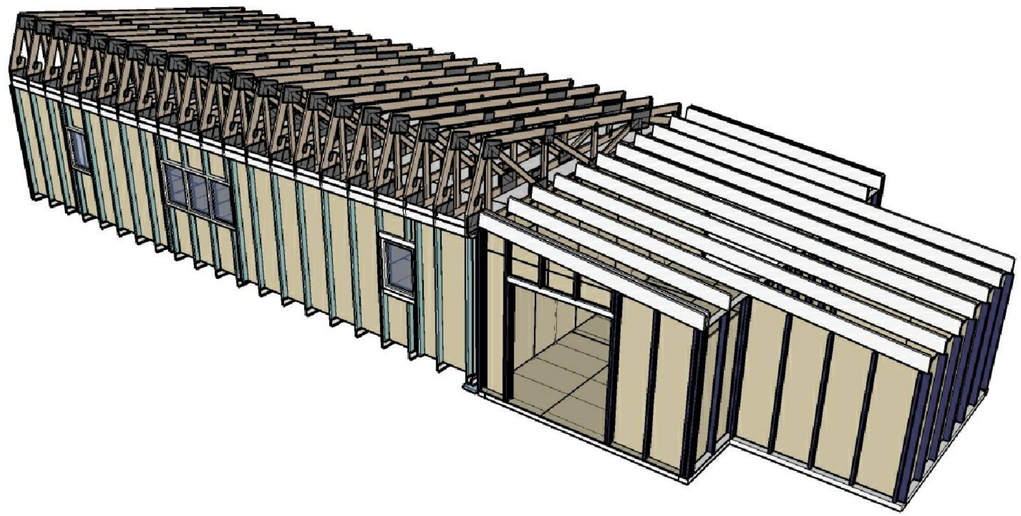
A0.1

SHEET 2 OF 10



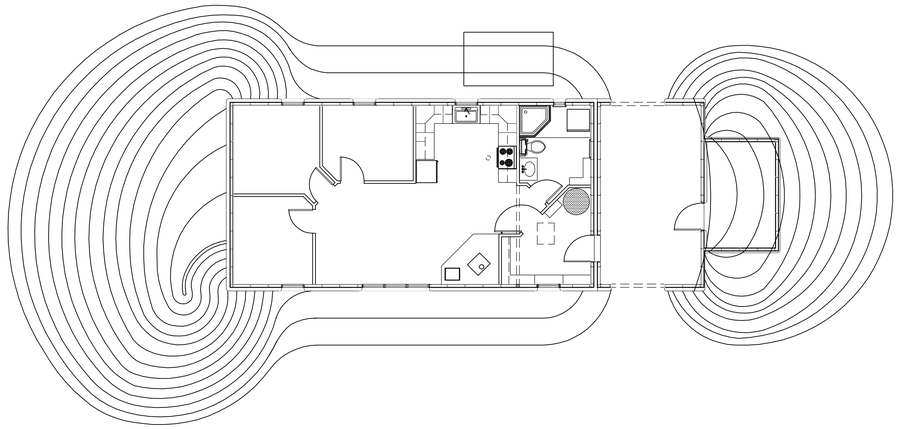

# 1 FIRST FLOOR PLAN

Scale: 1'-0"= 1/4"



3 3D IMAGE OF FRAMED HOUSE

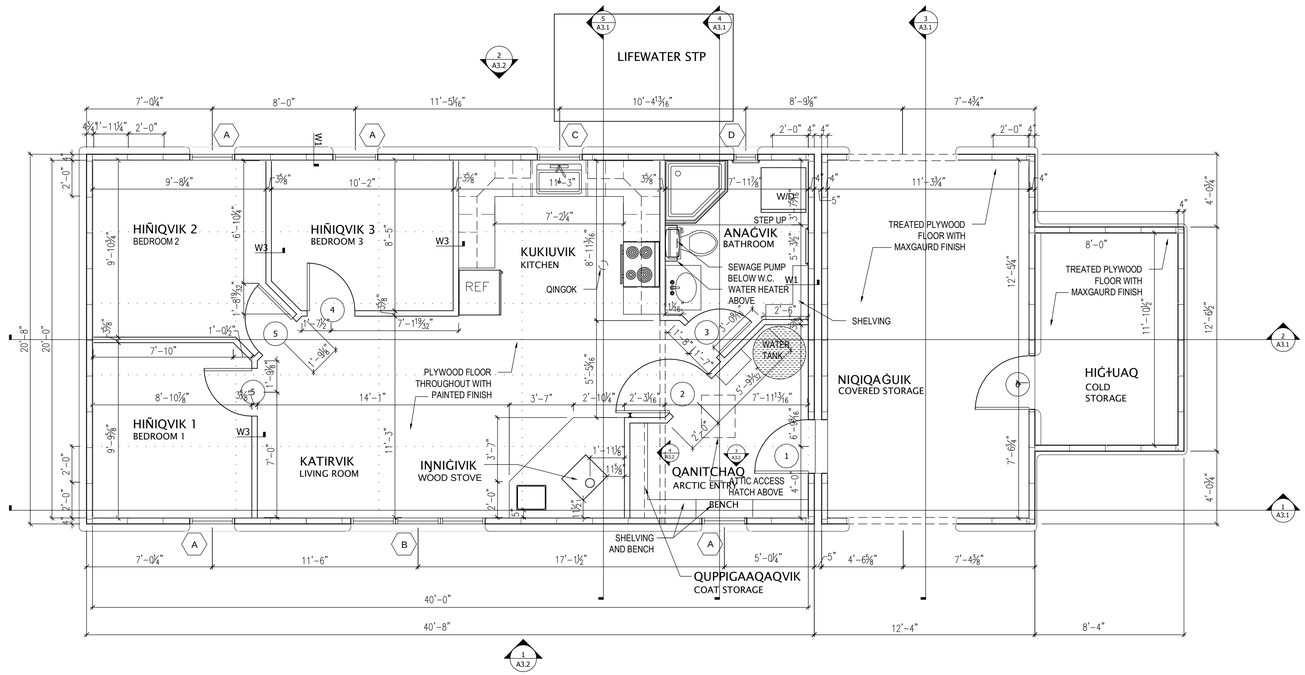
NOT TO SCALE



2 PLAN WITH EARTH BERMING

0 1' 2' 4' 8'

Scale: 1'-0"= 1/8"




1 FIRST FLOOR PLAN

0 1' 2' 4' 8'

Scale: 1'-0"= 1/4"

N

| No. | Rev./Issue | Date |
|---|---|---|
| | | |
| | | |

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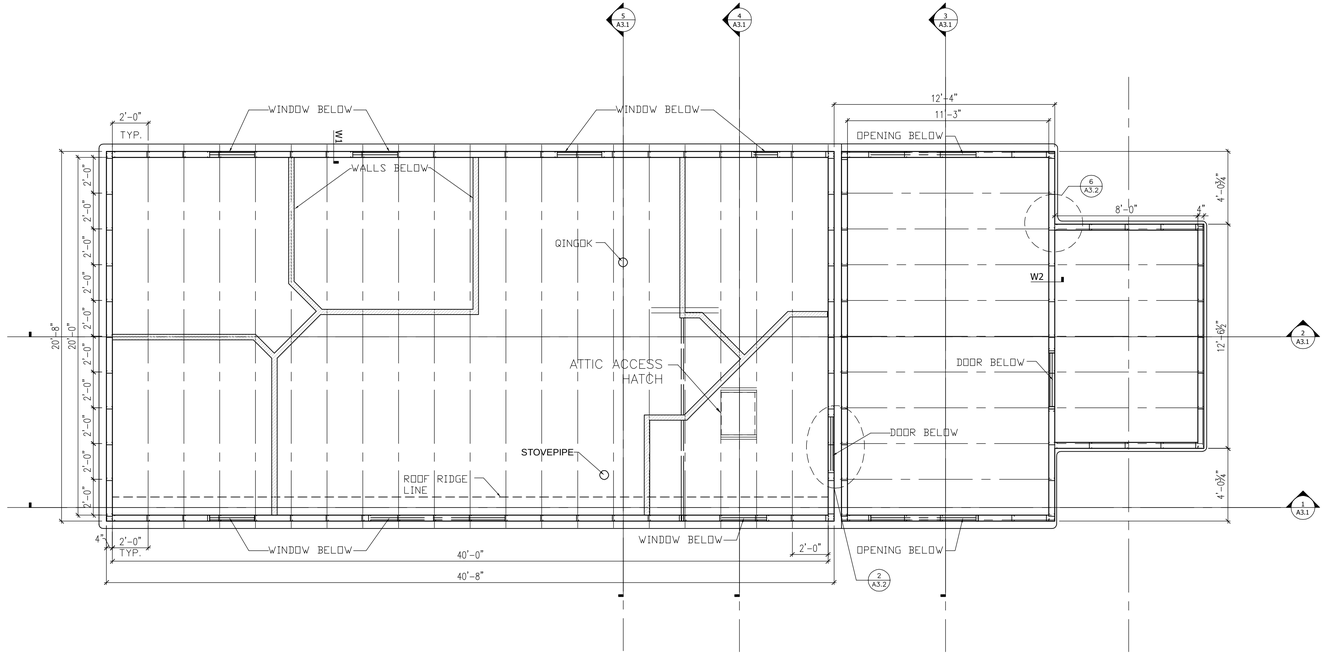
FIRST FLOOR PLAN

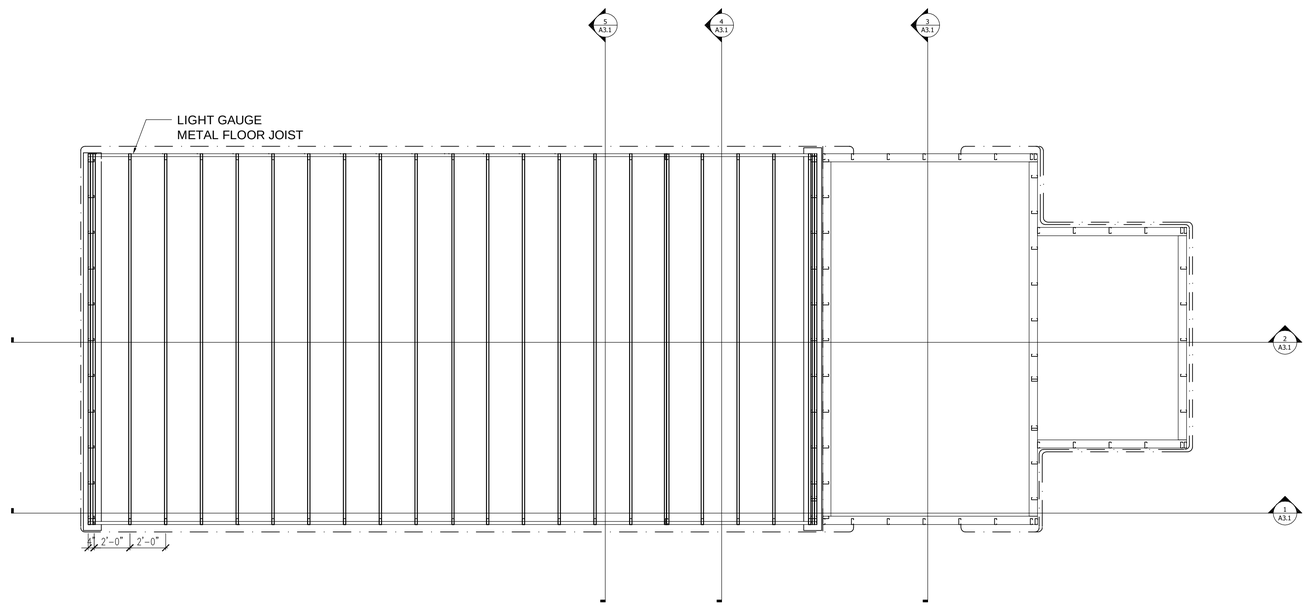
A1.1

SHEET 3 OF 10




2 TRUSS/ROOF FRAMING PLAN

Scale: 1'-0"= 1/4"




1 FOUNDATION FRAMING PLAN

Scale: 1'-0"= 1/4"

N

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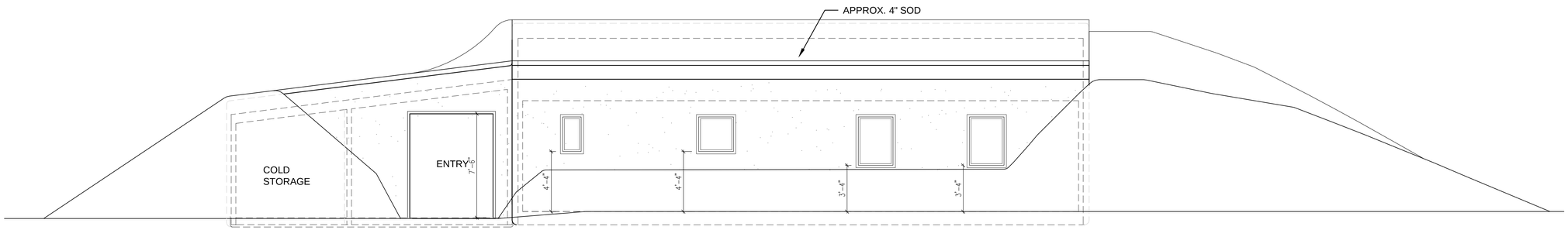
FRAMING PLANS

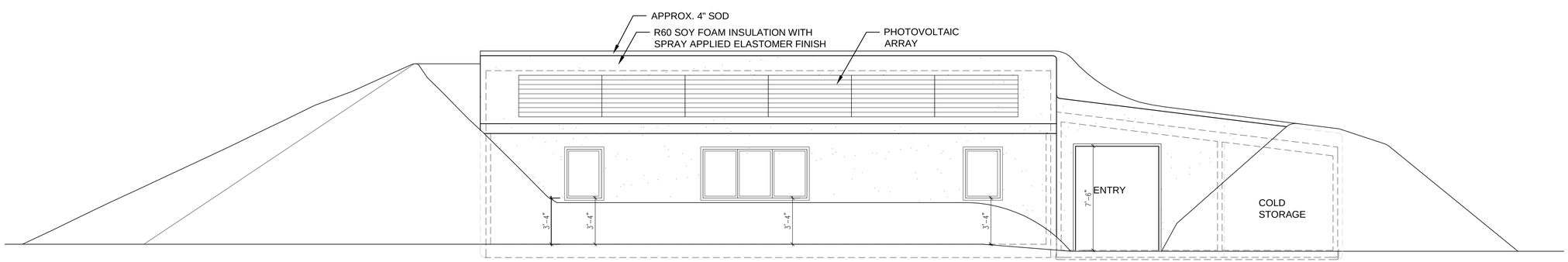
A1.2

SHEET 4 OF 10




2 NORTH ELEVATION

Scale: 1'-0"= 1/4"




1 SOUTH ELEVATION

Scale: 1'-0"= 1/4"

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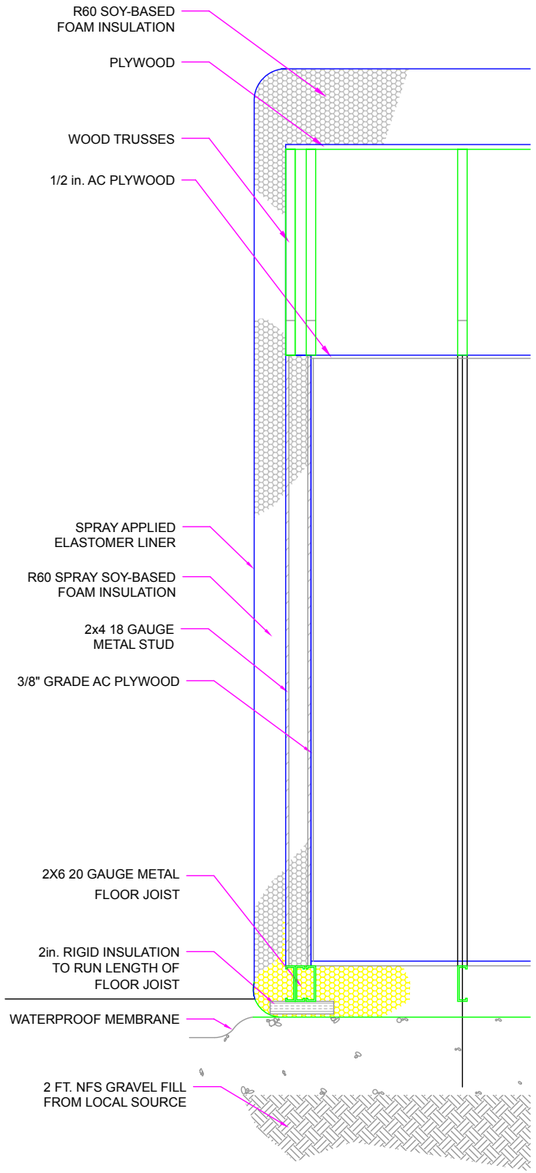
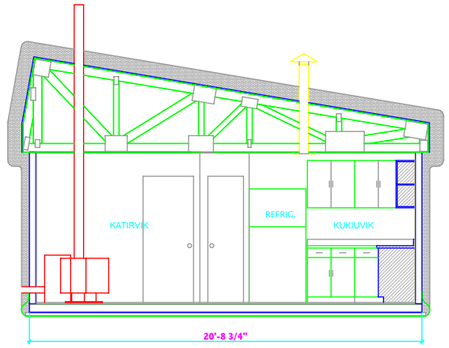
BUILDING ELEVATIONS

A2.1

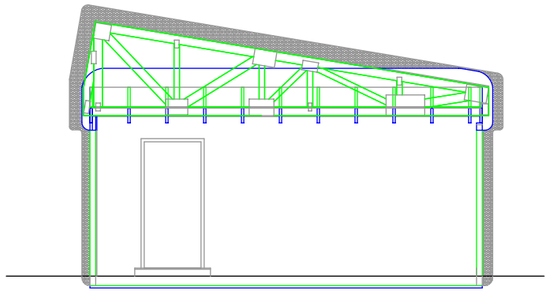
SHEET 5 OF 10




6 **TYPICAL WALL SECTION** Scale: 1'-0"= 1/2"

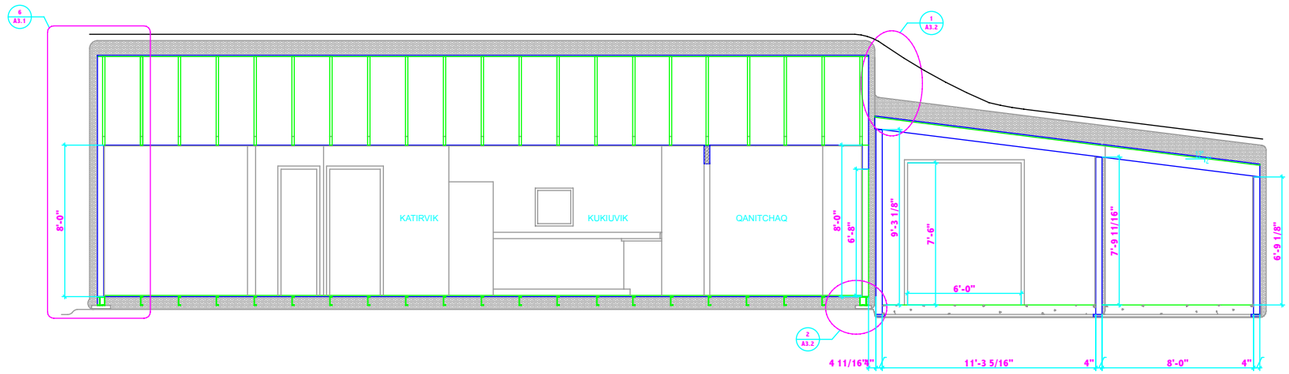



5 **BUILDING SECTION** Scale: 1'-0"= 1/8"



SECTION 4

3 **BUILDING SECTION** Scale: 1'-0"= 1/8"




1 **BUILDING ELEVATION** Scale: 1'-0"= 1/8"

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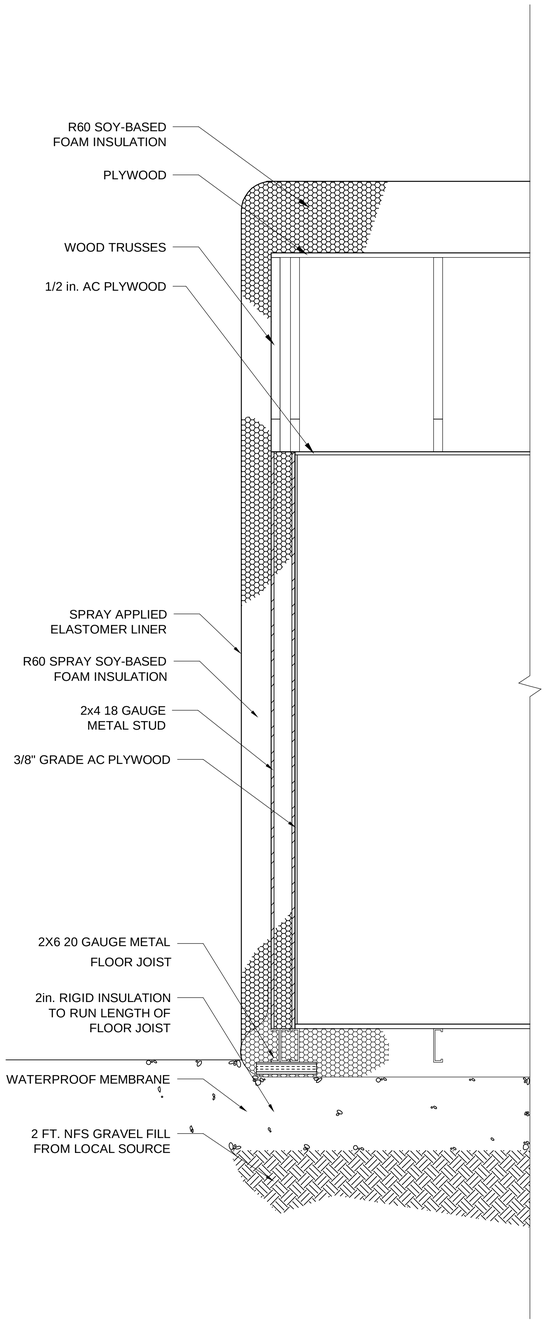
ISSUED
05 MAY 2009
DESIGN DEVELOPMENT PROGRESS SET

BUILDING SECTIONS

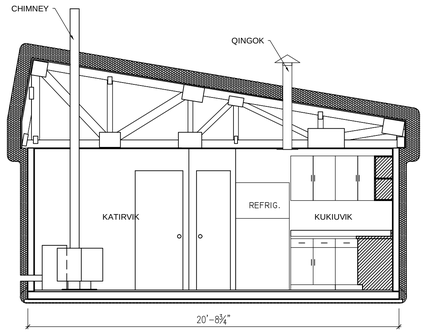
A3.1

SHEET 6 OF 6



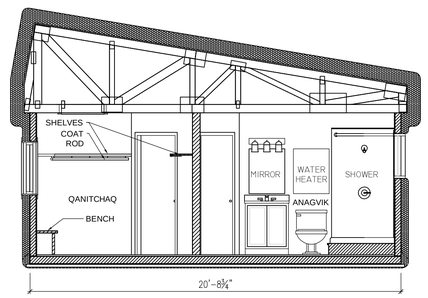

6 TYPICAL WALL SECTION

Scale: 1'-0"= 1"



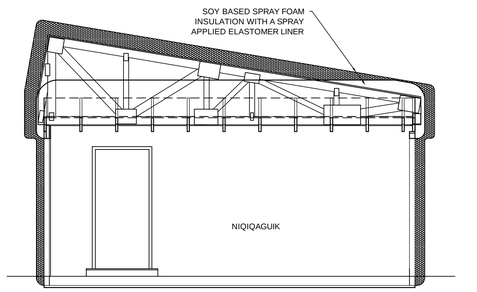

5 BUILDING SECTION

Scale: 1'-0"= 1/4"



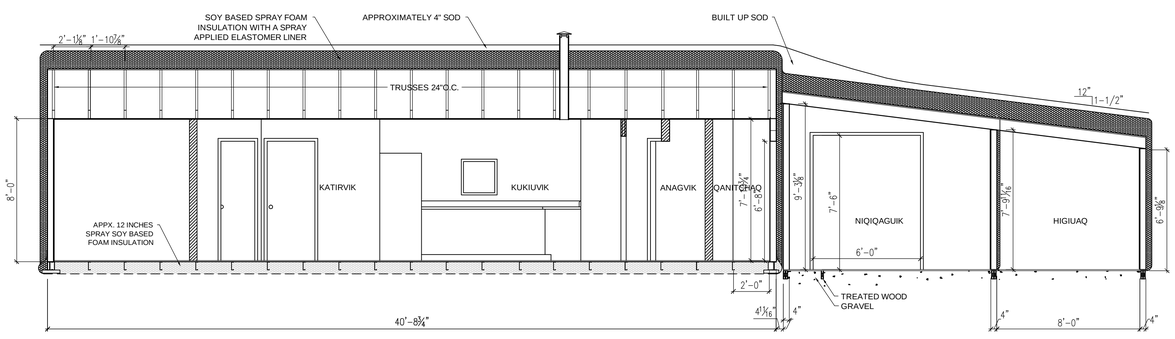

4 BUILDING SECTION

Scale: 1'-0"= 1/4"



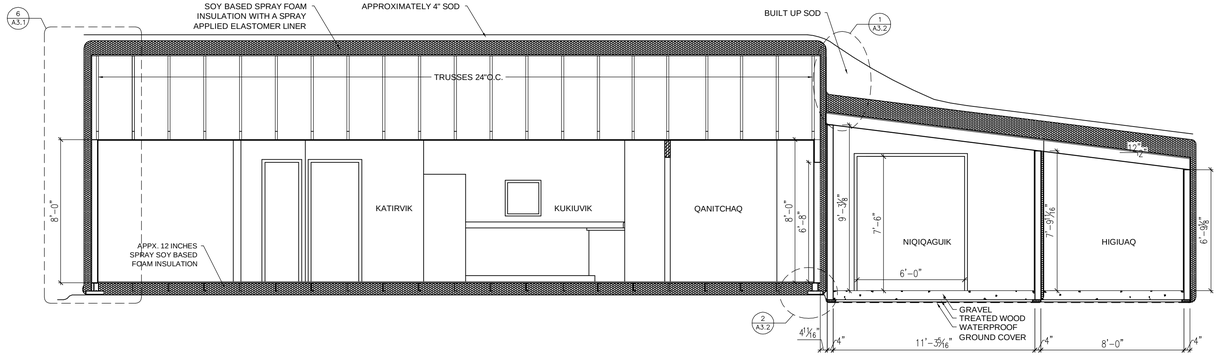

3 BUILDING SECTION

Scale: 1'-0"= 1/4"




2 BUILDING SECTION

Scale: 1'-0"= 1/4"




1 BUILDING SECTION

Scale: 1'-0"= 1/4"

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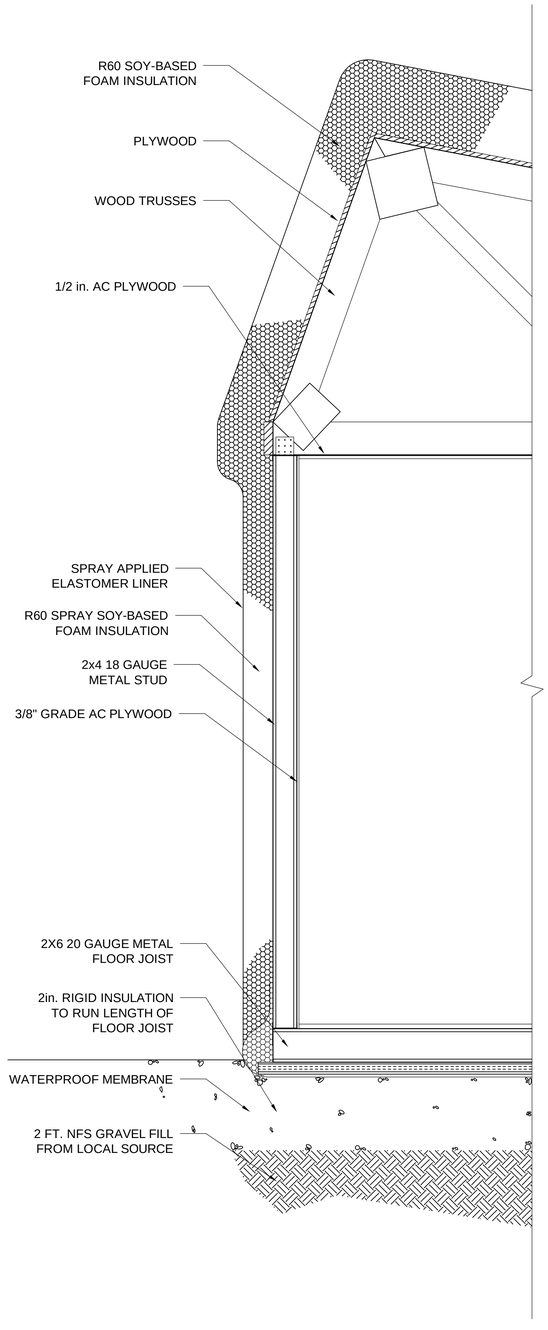
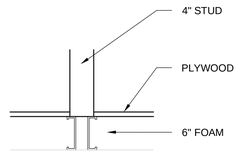
BUILDING SECTIONS

A3.1

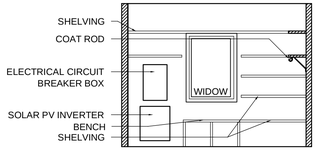
SHEET 6 OF 10



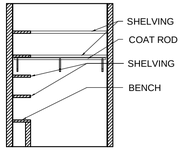

5 TYPICAL WALL SECTION
0 1' 2'
Scale: 1'-0"= 1"



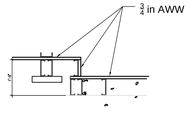

6 DETAIL
0 1' 2'
Scale: 1'-0"= 1"



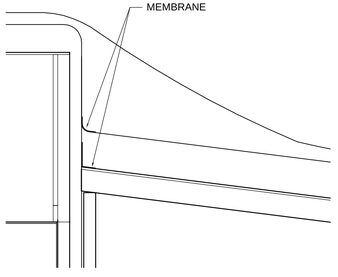

4 INTERIOR ELEVATION
0 1' 2' 4' 8'
Scale: 1'-0"= 1/4"




3 INTERIOR ELEVATION
0 1' 2' 4' 8'
Scale: 1'-0"= 1/4"




2 DETAIL
0 1' 2' 3'
Scale: 1'-0"= 1/2"




1 ROOF DETAIL
0 1' 2' 3'
Scale: 1'-0"= 1/2"

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WALL SECTIONS, DETAILS, & INTERIOR ELEVATIONS

A3.2

SHEET 6 OF 10

**Wrapped Face Geogrid Installation Guidelines**
**CCHRC Sustainable Northern Shelter**
**Anaktuvik Pass Project**

A. Geogrid placement:

1. Unroll the geogrid and cut to the length indicated in the approved shop drawings.
2. Place geogrid on level and compacted reinforced fill at locations indicated in the approved drawings.
3. Primary strength direction of the geogrid shall be placed perpendicular to the face of the structure or aligned as indicated in the approved shop drawings.
4. Pull the geogrid taut to remove slack in the geogrid.
5. Stake, pin or otherwise restrain the geogrid near the end to maintain alignment and to prevent development of slack during backfill placement.
6. Adjacent embedment lengths of geogrid shall abut to provide 100% coverage at elevations requiring geogrid reinforcement, as indicated in the approved drawings.
7. Place a minimum of 3 inches (75 mm) of fill between overlapping layers of geogrid where overlapping occurs behind curves and corners.
8. Construction vehicles shall not be operated directly on the geogrid. A minimum of 6 inches (150 mm) of fill cover over the geogrid is required for operation of construction vehicles in the reinforced zone.
9. Turning of vehicles should be avoided to prevent dislocation or damage to the geogrid.
10. Primary geogrid may not be overlapped or connected mechanically to form splices in the primary strength direction.

B. Reinforced backfill placement:

1. Place the reinforced backfill material in maximum compacted lifts of 9 inches (200 mm) and compact to a minimum Standard Proctor Dry Density of 95 percent within -1 to +2 percent of optimum moisture content, per ASTM D 698. Compaction shall be achieved throughout the full lift thickness. Minimum compaction shall meet or exceed the requirements stated or as required by the project specifications, whichever is more stringent.
2. Use only walk-behind compaction equipment within 3 feet of the structure face. Use a minimum of 3 passes to compact this zone.
3. Required level of compaction shall be achieved throughout the entire reinforced backfill zone, as measured from the face of the retained slope to the end of geogrid reinforcement. Reinforced fill zone limits shall be as indicated on the approved drawings.
4. Smooth and level the backfill as indicated so that the geogrid lays flat. Grade shall not slope towards the front face of the structure.
5. After compaction of the layer in lifts, wrap the geogrid back over the face of the compacted layer the distance shown on the plans, providing a minimum of 6 inches of soil between this "wrapped face" layer and the next full length layer of geogrid for a minimum of 3 feet.



**REINFORCED SOIL SLOPE DESIGN**

**SIMPLE WEDGE METHODS (Schmertmann, 1987)**
(as found at www.geogrid.com, Strata Systems website:
http://www.geogrid.com/content/view/87/173/, click Strata Design Manual, pp7-10)

**Project:** CCHRC Sustainable Northern Shelter
**Date:** 03/06/2009
**Designer:** glj

**Case #1:** H = 13'

| | | |
|---|---|---|
| phi | 32 | |
| tan phi | 0.625 | |
| FS | 2 | |
| phi' | 17.35 | deg |
| H | 13 | ft |
| q | 60.00 | psf |
| γ | 120 | pcf |
| H' | 13.5 | ft |
| | | 6.0 |

**Maximum Tensile Force, Tmax**

| | | |
|---|---|---|
| β | 80 | deg |
| | 6 | :1 |
| K | 0.56 | Figure 6 |
| Tmax | 6123.6 | lb. |

**Select Geotextile Fabric & Lengths**

| | | |
|---|---|---|
| Fabric | Microgrid (Strata Systems, Inc.) | |
| Tult | 2000 | lb |
| LTDS | 871 | lb |
| Lb/H' | 0.93 | Fig 7 |
| Lb | 12.6 | ft |
| Lt/H' | 0.93 | Fig 7 |
| Lt | 12.6 | ft |

**Number of Layers: N=Tmax/LTDS**

| | | |
|---|---|---|
| Ncalc | 7.0 | |
| Ndsn | 7.0 | |
| Sv | 22.3 | in |
| Sv(dsn) | 18 | in |

**Case #2:** H = 9'

| | | |
|---|---|---|
| phi | 32 | |
| tan phi | 0.625 | |
| FS | 2 | |
| phi' | 17.35 | deg |
| H | 9 | ft |
| q | 60.00 | psf |
| γ | 120 | pcf |
| H' | 9.5 | ft |

**Maximum Tensile Force, Tmax**

| | | |
|---|---|---|
| β | 80 | deg |
| K | 0.56 | Figure 6 |
| Tmax | 3032.4 | lb. |

**Select Geotextile Fabric & Lengths**

| | | |
|---|---|---|
| Fabric | Microgrid (Strata Systems, Inc.) | |
| Tult | 2000 | lb |
| LTDS | 871 | lb |
| Lb/H' | 0.93 | Fig 7 |
| Lb | 8.8 | ft |
| Lt/H' | 0.93 | Fig 7 |
| Lt | 8.8 | ft |

**Number of Layers: N=Tmax/LTDS**

| | | |
|---|---|---|
| Ncalc | 3.5 | |
| Ndsn | 4.0 | |
| Sv(calc) | 27.0 | in |
| Sv(dsn) | 24 | in |



# PRODUCT DATA

STRATA
Global GeoSolutions

## STRATAGRID®

Stratagrid is a geogrid reinforcement for soil. These high performance geogrids are constructed of high molecular weight and high tenacity knitted polyester yarns with a polymer coating. Stratagrid is engineered to be mechanically and chemically durable in both the harsh construction installation phase and in aggressive soil environments (pH range from 2-10).

| Design Properties | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ultimate and Creep Limited Tensile Strengths | | | Minimum | SG120 | SG200 | SG300 | SG500 | SG650 | SG800 | SG950 |
| Ultimate Strength [1] | ASTM D 6637 Method A | lbf/ft (kN/m) | 2,000 (29.2) | 1,875 (27.4) | 3,600 (52.5) | 5,000 (73.0) | 8,000 (93.4) | 8,150 (118.9) | 9,100 (132.8) | 11,800 (172.2) |
| Creep Limited Strength | ASTM D 5262, D 6992 | lbf/ft (kN/m) | 1,149 (16.8) | 1,710 (17.7) | 2,323 (33.9) | 3,226 (47.1) | 4,129 (60.3) | 5,258 (76.7) | 5,871 (85.7) | 7,613 (111.1) |
| Long-term Design Strength (LTDS or T_a) | | | | | | | | | | |
| Sands, Silt and Clay | | lbf/ft (kN/m) | 871 (12.7) | 916 (13.4) | 1,919 (28.0) | 2,666 (38.9) | 3,508 (51.2) | 4,467 (65.2) | 4,988 (72.8) | 6,468 (94.4) |

| Molecular Properties | | | |
|---|---|---|---|
| Item | Test Method | Unit | Spec |
| Molecular Weight (min) | GRI GG8 | g/mol | 25,000 |
| Caboxyl End Group (CEG) Count (max) | GRI GG7 | meq/kg | 30 |

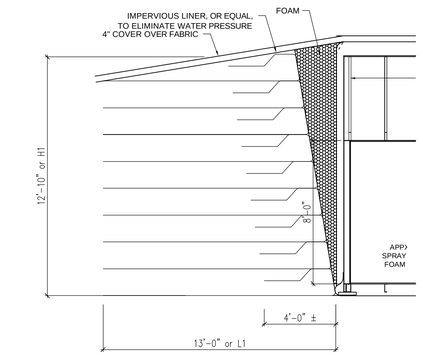
| Physical Properties | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Roll Dimensions [2] | Width x Length | feet (m) | 6 x 225 (1.83 x 68.6) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) | 6 x 300 (1.83 x 91.4) |
| | | | 12 x 150 (3.66 x 45.7) | 12 x 150 (3.66 x 45.7) | 12 x 200 (3.66 x 61.0) | 12 x 200 (3.66 x 61.0) | 12 x 200 (3.66 x 61.0) | 12 x 200 (3.66 x 61.0) | 12 x 200 (3.66 x 61.0) | 12 x 200 (3.66 x 61.0) |
| Area | | Sq yds (Sq m) | 200 (167.3) | 200/200 (167.3/167.3) | 200/267 (167.3/223.0) | 200/267 (167.3/223.0) | 200/267 (167.3/223.0) | 200/267 (167.3/223.0) | 200/267 (167.3/223.0) | 200/267 (167.3/223.0) |

## STRATATEX

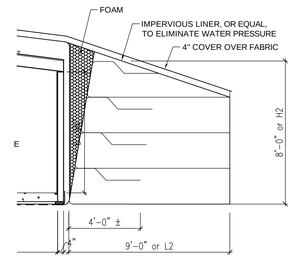
StrataTex (ST Series) is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. StrataTex (SW Series) geotextile fabrics are woven polypropylene materials offering optimum performance when used in stabilization applications. StrataTex is engineered to be mechanically and chemically durable, in both the harsh construction installation phase and in aggressive soil environments (pH range from 2-13).

| Design Properties | | | ST140 4.0 oz | ST142 5.0 oz | ST160 6.0 oz | ST170 7.0 oz | ST180 8.0 oz | ST110 10.0 oz | SW200 4.0 oz | SW300 6.0 oz |
|---|---|---|---|---|---|---|---|---|---|---|
| Grab Tensile Strength | ASTM D4632 | lbf (kN) | 100 (0.445) | 120 (0.53) | 160 (0.71) | 180 (0.80) | 215 (0.011) | 250 (1.11) | 200 (0.89) | 315 (1.40) |
| Grab Elongation | ASTM D4632 | % | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Trapezoid Tear | ASTM D4533 | lbf (kN) | 50 (0.22) | 50 (0.22) | 65 (0.29) | 75 (0.33) | 85 (0.38) | 100 (0.44) | 75 (0.33) | 105 (0.44) |
| Puncture Resistance | ASTM D4833 | lbs (kN) | 65 (0.29) | 70 (0.31) | 90 (0.40) | 105 (0.47) | 130 (0.58) | 160 (0.71) | 90 (0.40) | 120 (0.53) |

| Physical Properties | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Roll Dimension | Width x Length | feet | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 | 12.5 x 360 |
| | | | 15 x 360 | 15 x 360 | 15 x 300 | 15 x 300 | 15 x 300 | 15 x 300 | 15 x 300 | 15 x 300 |
| Area | | Sq yds | 500/600 | 500/600 | 500/500 | 500/500 | 500/500 | 500/500 | 500/600 | 500/500 |
| Weight per Roll [3] | | lbs | 146/177 | 150/182 | 195 | 220 | 240 | 320 | 185 | 210 |




2 BUILDING SECTION
0 1' 2' 4' 8'
Scale: 1'-0"= 1/4"




1 BUILDING SECTION
0 1' 2' 4' 8'
Scale: 1'-0"= 1/4"

| RETAINED HEAT (FT) | SPACING S (FT) | FABRIC LENGTH (FT) |
|---|---|---|
| *H1 = 13' ± | S1=18" MAX | L1 = 13' |
| **H2 = 9' ± | S2 = 24" MAX | L2 = 9' |

*H1 IS @ BEDROOM END OF SHELTER
**H2 IS @ COLD STORAGE END OF SHELTER

Y = 120 pcf
Ø = 32°
C'= 0
u, PORE PRESSURE = 0

GEOTEXTILE WRAPPED-FACE RETAINED SOIL

FABRIC SPEC:
STRATAGRID,
MICROGRID
$T_{ult}$ = 2000 lb/ft
LTDS = 871 lb/ft

DESIGNED WITH: THE RESIDENTS OF ANAKTUVIK PASS,
BY: HEBERT, COOKE, GRUNAU
DRAWN BY: JJG, KS
General Notes

| No. | Rev./Issue | Date |
|---|---|---|
| | | |
| | | |
| | | |

COLD CLIMATE HOUSING RESEARCH CENTER
CCHRC
1000 FAIRBANKS STREET
P.O. BOX 82489
FAIRBANKS, AK 99708-2489
(907) 457-3454
www.cchrc.org

PROJECT
**SUSTAINABLE NORTHERN SHELTER**
ANAKTUVIK PASS PROTOTYPE HOUSE
ANAKTUVUK PASS, ALASKA
ISSUED
14 JUNE 2009
CONSTRUCTION DOCUMENTS

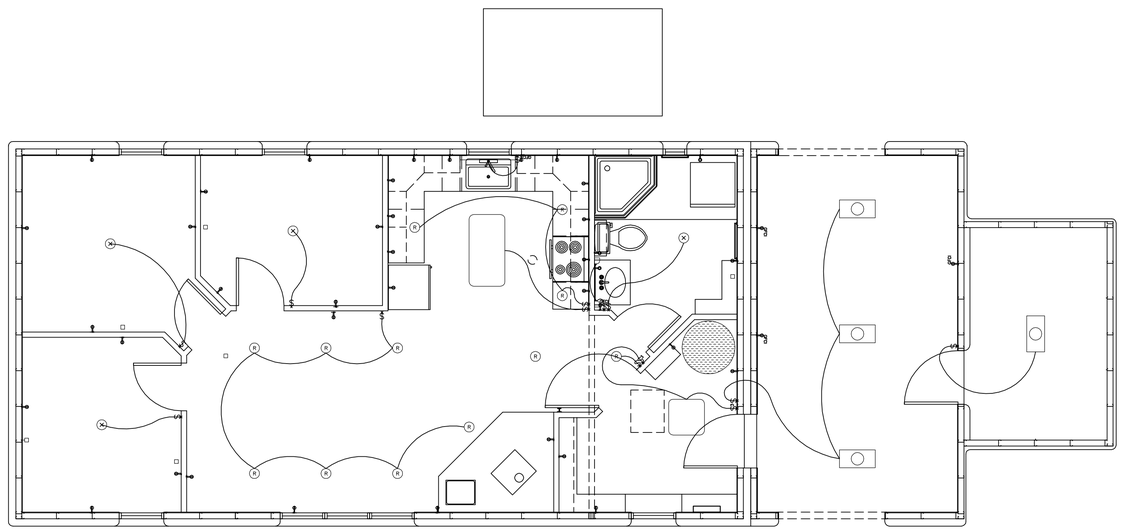
EARTH BERM
STRUCTURAL DETAILS

A3.3

SHEET 6 OF 11

## ELECTRICAL SYMBOLS

- ELECTRICAL OUTLET
- ELECTRICAL GFCI OUTLET
- SPECIAL PURPOSE ELECTRICAL OUTLET
- LIGHT SWITCH
- 3-WAY LIGHT SWITCH
- SMOKE DETECTOR
- SURFACE MOUNTED LIGHT FIXTURE
- RECESSED LIGHT FIXTURE
- LED TUBE SURFACE MOUNTED LIGHT FIXTURE
- 2 FT. CLOUD LIGHT FIXTURE
- 4 FT. CLOUD LIGHT FIXTURE
- VALANCE- SINGLE LED TUBE LIGHT FIXTURE



1 ELECTRICAL LIGHTING LAYOUT

0 1' 2' 4' 8'
Scale: 1'-0"= 1/4"

N

DESIGNED WITH: THE RESIDENTS OF ANAKTUVUK PASS,
BY: HEBERT, COOKE, GRUNAU
DRAWN BY: JJG, KS
General Notes

| No. | Rev./Issue | Date |
|---|---|---|
| | | |
| | | |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PROJECT
# SUSTAINABLE NORTHERN SHELTER
## ANAKTUVIK PASS PROTOTYPE HOUSE

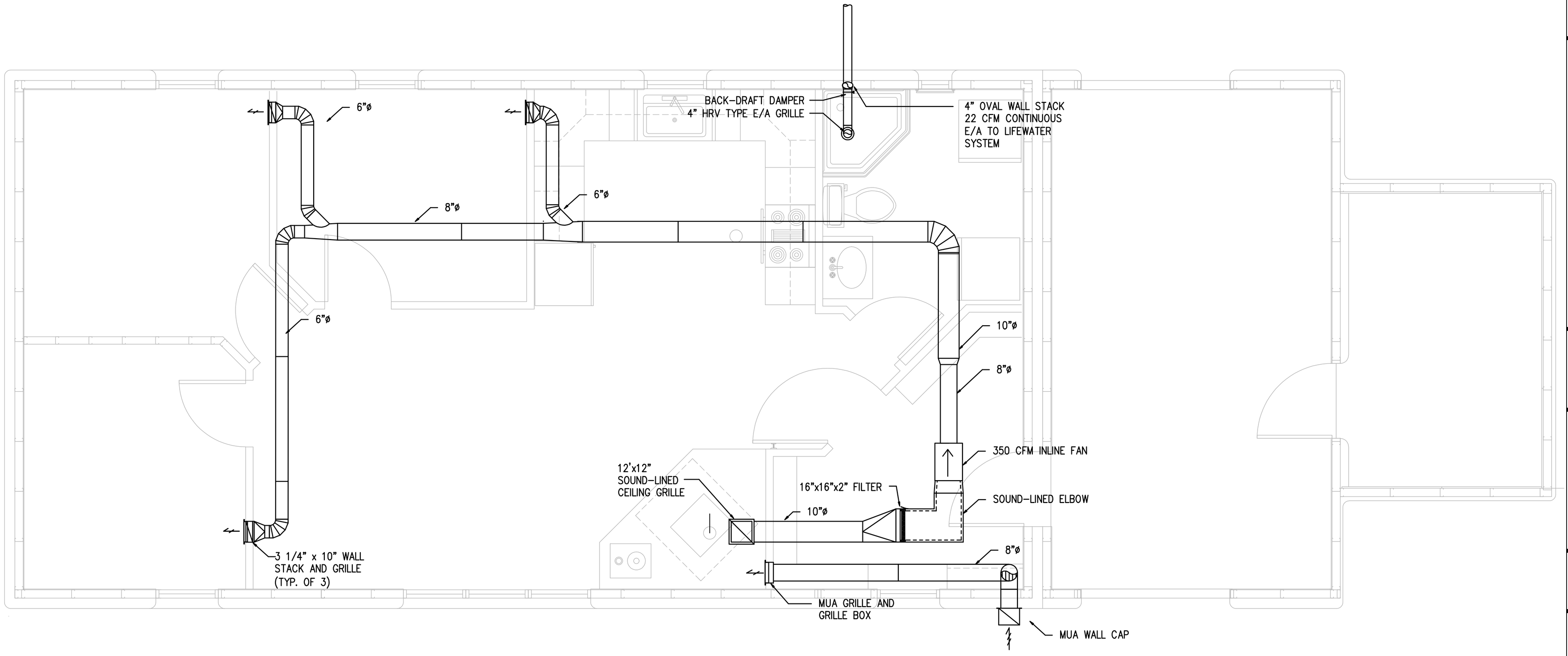
ANAKTUVUK PASS, ALASKA

ISSUED
14 JUNE 2009
CONSTRUCTION DOCUMENTS

ELECTRICAL LIGHTING LAYOUT

E1.1

SHEET 4 OF 11




N

## VENTILATION PLAN

**Scale: 1/2"= 1'-0"**


HOLADAY-PARKS, INC.
Building Comfort since 1889

1820 MARIKA
FAIRBANKS, AK 99709 • (907) 452-7151
4600 S. 134TH PLACE • P.O. BOX 66208
SEATTLE, WA 98166 • (206) 248-9700
WWW.HOLADAYPARKS.COM
ALASKA LICENSE NUMBER: 183315


PROJECT

**CCHRC HOUSING PROJECT**

**ANATUVK PASS ALASKA**

DESIGN TEAM

Designed by:
Drawn by:
Approved by:
Job Number:
Filename: ANATUVIK PASS HVAC.DWG

REGISTRATION

**APPROVED FOR CONSTRUCTION**

ISSUE NAME/DATE

REVISIONS

| No. | Date | By | Description |
|---|---|---|---|

SHEET TITLE

**VENTILATION PLAN ANATUVIK PASS HOUSING**

SHEET NUMBER

**M1**

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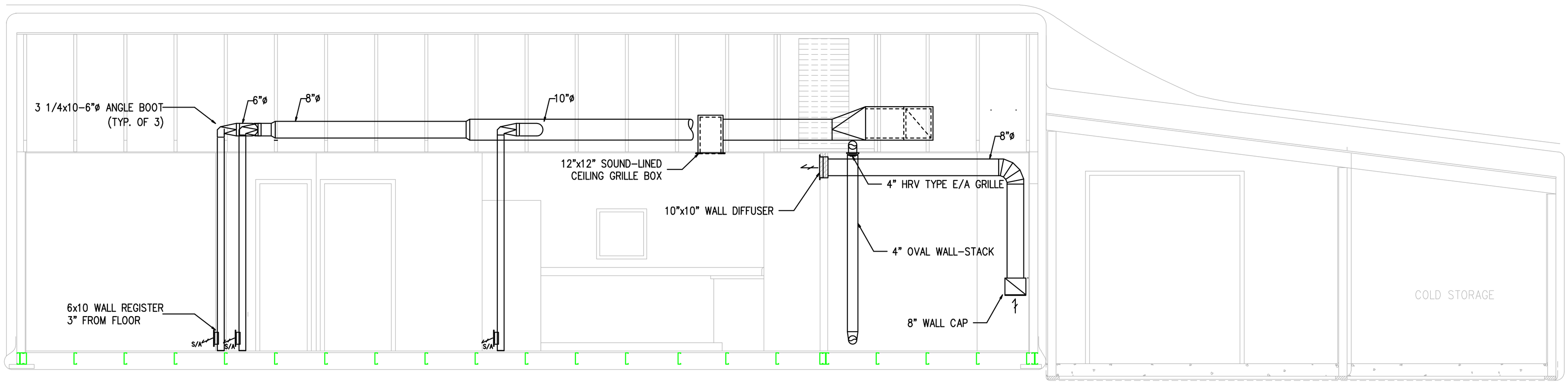


## VENTILATION ELEVATION VIEW

Scale: 1/2"= 1'-0"

| SHOP BUILT FITTINGS |
|---|
| 12"x12"x18" SOUND-LINED CEILING GRILLE BOX (TRANSFER AIR CEILING GRILLE) |
| 16"x16" SOUND-LINED FILTER ELBOW |
| 16"x16"-FAN INLET REDUCER |
| 10"x10" WALL GRILLE BOX (MUA GRILLE) |
| 8" WALL CAP |

| | | MATERIALS LIST |
|---|---|---|
| ITEM | # | DESCRIPTION |
| 10" WA PIPE | (5) | 5'x10"ø |
| 8" WA PIPE | (7) | 5'x8"ø |
| 6" WA PIPE | ~~(8)~~(9) | 5'x6"ø |
| 4" WA PIPE | (1) | 5'x4"ø |
| PIPE ELBOWS | (1) | 10"ø ADJ. 90° |
| PIPE ELBOWS | (2) | 8"ø ADJ. 90° |
| PIPE ELBOWS | ~~(4)~~(7) | 6"ø ADJ. 90° |
| PIPE ELBOWS | (2) | 6"ø ADJ. 45° |
| REDUCERS | (1) | 8"ø-6"ø |
| CONE WYES | (1) | 10"øx8"øx6"ø |
| CONE WYES | (1) | 8"øx6"øx6"ø |
| 4" OVAL PIPE | (1) | 4"OVALx8' |
| WALL STACK | (6) | 3 1/4"x10"x5' WALL STACK |
| 6" BOOTS | (5) | 3 1/4"x10"-6"ø (3 straight, 2 Angle) |
| 4" BOOTS | (2) | 4"OVAL - 4"ø (4" ADJ. ELBOW, DEFORM ONE END) |
| AIR FILTER | (2) | 16"x16"x2 PLEATED FILTER, PLUS ONE SPARE |
| GRILLES | (1) | 4"ø HRV-TYPE GRILLE |
| FANS | (1) | 8" PANASONIC IN-LINE FAN |
| TAPE | (2) | ROLLS OF METAL TAPE |
| SCREWS | (350) | 300 SHORT, 50 LONG |
| HANGER STRAP | (10) | 100' OF 10' HANGER FLAT AND ANGLE STRAPS |
| CHINA CAP | (1) | 6" CHINA CAP |

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PROJECT

**CCHRC HOUSING PROJECT**
ANATUVK PASS
ALASKA

DESIGN TEAM

Designed by:
Drawn by:
Approved by:
Job Number:
Filename: ANATUVIK PASS HVAC.DWG

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