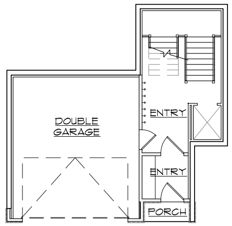
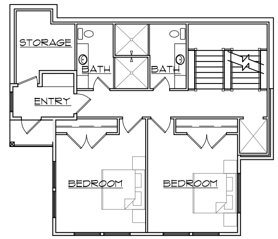
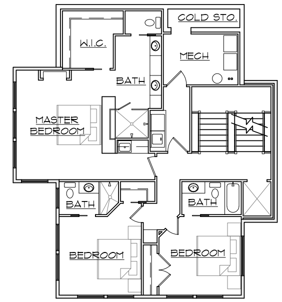
# Exhibit A-Approved Plans



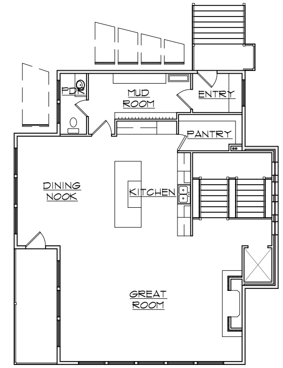

BASEMENT FLOOR PLAN




FIRST LEVEL FLOOR PLAN



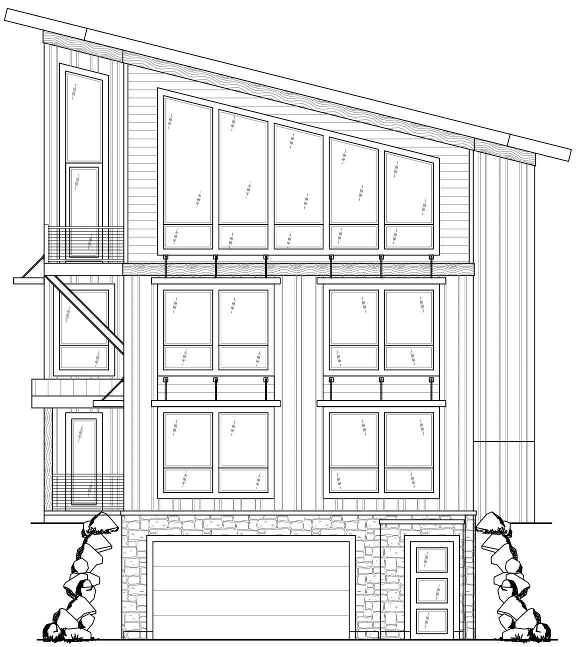

SECOND LEVEL FLOOR PLAN




THIRD LEVEL FLOOR PLAN

BID COPY ONLY NOT FOR CONSTRUCTION





FRONT ELEVATION

CLIENT:

JIM & ALLY DEPIANO

CONTRACTOR:

SOLITUDE BUILDERS

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DESIGNER:

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OGDEN, UT 84405
801-476-1860

HABITATIONS
RESIDENTIAL DESIGN GROUP


DISCLAIMERS AND CONSTRUCTION WARNINGS:

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PROJECT INFORMATION

| SQUARE FOOTAGE CALCULATIONS | | | |
|---|---|---|---|
| UPPER FLOOR | 1489 SQ. FT. | CLIENT: | JIM & ALLY DEPIANO |
| MAIN FLOOR | 1448 SQ. FT. | TYPE: | RESIDENTIAL PLAN |
| LOWER FLOOR | 1163 SQ. FT. | ISSUE DATE: | XX/XX/2016 |
| BASEMENT | 365 SQ. FT. | REV. DATE: | |
| GARAGE | 463 SQ. FT. | | |

LOCATION:
ASPEN DRIVE
LOT #42-R
POWDER MOUNTAIN WEST PHASE 2
EDEN CITY, WEBER COUNTY, UTAH


CODE: IRC 2015

| PLAN NUMBER: | SHEET NUMBER: |
|---|---|
| 4S4465 | 1 OF 15 |

Exhibit A-Approved Plans

## GENERAL MATERIALS SPECIFICATIONS:

("THE FOLLOWING GENERAL MATERIALS SPECIFICATIONS ARE PRESENTED FOR INFORMATION ONLY". THE GENERAL CONTRACTOR/ OWNER/ STRUCTURAL ENGINEER/ PROFESSIONAL TRADE CONTRACTORS/ GOVERNING JURISDICTIONS SHALL BE RESPONSIBLE FOR THE SELECTIONS AND APPLICATION OF ACTUAL MATERIALS UTILIZED. HABITATIONS MAKES NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF OR CODE COMPLIANCE OF THESE GENERAL MATERIALS. )

1. EXCAVATION:
A. CONTRACTOR TO VERIFY SOIL CONDITION AND PROVIDE STABILIZATION AS REQUIRED (SEE SITE PLAN).
B. ALL EARTH UNDER STRUCTURE OR SLAB SHALL BE STERILIZED.

2. CONCRETE:
A. FOOTINGS AND FOUNDATIONS SHALL BE ON UNDISTURBED SOIL. IF ANY UNSTABLE OR COLLAPSIBLE OR OTHERWISE POOR SOIL CONDITIONS ARE DISCOVERED, A SOILS ENGINEER SHOULD BE NOTIFIED FOR SOILS STABILITY. SOILS BEARING CAPACITY SHALL BE 1,500 PSF.
B. FOOTINGS: 3000 PSI MINIMUM COMPRESSIVE STRENGTH AFTER 28 DAYS. #4 REINFORCING BARS PER ASTM GR. 60, UNLESS OTHERWISE SPECIFIED BY ENGINEER. SEE ELEVATIONS FOR FOOTING DEPTH AS REQ'D BY LOCAL CONDITIONS/AUTHORITIES.
C. FOUNDATIONS: 3000 PSI MINIMUM COMPRESSIVE STRENGTH AFTER 28 DAYS. #4 & 5 REINFORCING BARS PER ASTM 615 GR, 60, UNLESS OTHERWISE SPECIFIED BY ENGINEER.
D. WATERPROOFING: TWO (2) COATS ASPHALT (TAR) EMULSION (BELOW GRADE).
E. CONCRETE SLAB: 2500 PSI MINIMUM COMPRESSIVE STRENGTH AFTER 28 DAYS, 4" MIN. (INTERIOR), 5" MIN. (EXTERIOR) THICK OVER 4" COMPACTED GRAVEL.
F. WATER DRAINAGE: PERFORATED ABS PIPE FULL PERIMETER OF FOUNDATION AND EXTENDING TO TERMINATION 20' FROM FOUNDATION AT ALL FOUNDATION CORNERS WITH GRAVEL OVERLAY (IF DETERMINED NECESSARY BY CONTRACTOR AND OWNER).

3. EXTERIOR WALLS:
A. STUDS: 2X6 #2 OR BTR HEMLOCK OR DOUGLAS FIR; 16" O.C. (UNLESS OTHERWISE NOTED).
B. SHEATHING: 7/16" OSB WAFERBOARD SHEATHING UNLESS OTHERWISE SPECIFIED BY STRUCTURAL ENGINEERING LATERAL ANALYSIS. FASTEN SHEAR PANEL 25' O.C. AND CORNERS WITH 8D NAILS 6" O.C. AT EDGE, 12" O.C. IN FIELD. SOLID BLOCK ABOVE SHEAR PANELS MINIMUM AND NAIL WITH 4-10D NAILS PER BLOCK. METAL HURRICANE TIES EVERY RAFTER OR TRUSS END.
C. VAPOR BARRIER: WRAP EXTERIOR WALLS WITH TYPAR HOUSEWRAP UNLESS OTHERWISE SPECIFIED.
D. MASONRY: (IF USED) NATURAL THIN CUT STONE BY NATURAL STONE CONNECTION ((801) 475-4216)) INSTALL AS PER MFG. SPECS (STYLE SHALL BE CONFIRMED WITH THE OWNER PRIOR TO INSTALLATION).
E. STUCCO: (IF USED) SYNTHETIC TYPE OVER STYRENE BOARD WITH BROWN COAT CONCRETE MIX. DRIVIT TYPE OR EQUAL. INSTALL AS PER MFG. SPECS (THE COLOR AND STYLE SHALL BE CONFIRMED WITH THE OWNER PRIOR TO INSTALLATION).
F. EXTERIOR WALL FINISHES MUST BE LISTED, LABELED AND INSTALLED AS PER MANUFACTURER'S INSTALLATION GUIDE. ALL INSTALLERS MUST BE APPROVED BY MANUFACTURER.

4. FLOOR FRAMING:
A. JOIST: TJI FLOOR JOISTS AS SHOWN ON PLANS BY TRUSS JOIST CORP. OR EQUAL (EXCEPT AS_OTHERWISE NOTED). MANUFACTURERS INSTRUCTIONS/SPECIFICATIONS SHALL BE FOLLOWED FOR INSTALLATION.
B. RIM JOISTS: 1-1/4"X11-7/8" TIMBERSTRAND AROUND ENTIRE PERIMETER OF STRUCTURE UNLESS OTHERWISE SPECIFIED.
C. BLOCKING: TJI TRUSS JOIST REQUIRED AT ALL LOAD BEARING WALLS ABOVE AND AT ALL CANTILEVERS
D. SILLPLATE: 2X REDWOOD OR PRESSURE TREATED FIR (INSULATE WITH POLYSTYRENE FOAM STRIP AGAINST (OVERHANGS) CONCRETE SURFACES).
E. SUB FLOOR: 3/4" T&G EXTERIOR WAFER BOARD OR (CDX) PLYWOOD, GLUED AND NAILED W/ 8D NAILS @ 6" OC EDGES, 12" OC ALONG INTERMEDIATE FRAMING MEMBERS.
F. MAIN FLOOR DIAPHRAGM BLOCKING REQUIRED FOR ALL FLOOR JOIST BAYS RUNNING PARALLEL WITH THE FOUNDATION (MUST HAVE FULL HEIGHT BLOCKING 48" O.C.)

5. INTERIOR WALLS
A. STUDS: 2X4 (2X6 WHERE NOTED) #2 OR BTR HEMLOCK OR DOUGLAS FIR, 16" O.C.
B. FINISH: WALLBOARD (WALLS & CEILINGS): 1/2" GYPSUM BOARD (WATERPROOF AT ALL SPLASH AREAS), 5/8" ONE HOUR FIRE RATED WALL & CEILING IN GARAGE AND UNDER ALL STAIRWAYS PER I.R.C. SECT. R302.6 & R302.7. APPLIED WITH SCREWS OR NAILS 6" OC CEILING, 7" OC WALLS. ROUNDED CORNERS TO MATCH THE EXISTING SHALL BE USED.
C. TUBS AND SHOWERS WITH TILE WALLS REQUIRE CEMENT, FIBER-CEMENT OR GLASS MAT GYPSUM BACKERS. GREEN BOARD IS NOT ALLOWED.

6. ROOF/CEILING FRAMING:
A. TRUSSES: #2 OR BTR HEMLOCK OR DOUGLAS FIR. REFER TO MANUFACTURER'S SPECS FOR TRUSS ENGINEERING. SIMPSON METAL HURRICANE TIES SHALL BE INSTALLED AT EACH TRUSS TO BEARING WALL INTERFACE.
B. RAFTERS: TJI ENGINEERED RAFTERS BY TRUSS JOIST CORP. OR EQ. OR 2X #2 OR BETTER HEMLOCK OR DOUGLAS FIR DIMENSIONAL LUMBER SHALL BE UTILIZED UNLESS OTHERWISE NOTED BY ENGINEER. SIMPSON METAL HURRICANE TIES SHALL BE INSTALLED AT EACH RAFTER TO BEARING WALL INTERFACE.
C. SHEATHING: 5/8" OR 11/16" 40/20 APA RATED SHEATHING OR EQUAL (GRAIN SHALL BE PERPENDICULAR TO SUPPORTS, EDGES SHALL BE FASTENED W/ 8D NAILS 6" O.C. @ 3/8" FROM EDGE OF PANEL AT ALL PANEL ENDS, SUPPORTED EDGES, SHEAR WALL TOPS AND ALL BLOCKING. NAIL @ 12" OC ALONG ALL INTERMEDIATE FRAMING MEMBERS.

7. ROOF:
A. UNDERLAY: 30 # FELT PAPER (WATER AND ICE SHIELD AT ALL VALLEYS AND AT ALL OVERHANGS).
B. FLASHING: ALUMINUM- SHALL BE INSTALLED IN SUCH A MANNER SO AS TO PREVENT MOISTURE FROM ENTERING A WALL, ROOF OR FLOOR AND REDIRECT IT TO THE EXTERIOR. FLASHING SHALL BE INSTALLED AT THE PERIMETERS OF EXTERIOR DOOR AND WINDOW ASSEMBLIES, PENETRATIONS AND TERMINATION'S OF EXTERIOR WALL ASSEMBLIES, EXTERIOR WALL INTERSECTIONS WITH ROOFS, CHIMNEYS, PORCHES, DECKS, BALCONIES AND SIMILAR PROJECTIONS AND AT BUILT-IN GUTTERS AND SIMILAR LOCATIONS WHERE MOISTURE COULD ENTER THE WALL. FLASHING WITH PROJECTED FLANGES SHALL BE INSTALLED ON BOTH SIDES AND THE ENDS OF COPINGS, UNDER SILLS AND CONTINUOUSLY ABOVE PROJECTED TRIM. A FLASHING SHALL BE INSTALLED AT THE INTERSECTION OF THE FOUNDATION TO STUCCO, MASONRY, SIDING OR BRICK VENEER. THE FLASHING SHALL BE AN APPROVED CORROSION- RESISTANT FLASHING .
C. VENTILATION: RIDGE OR HIP ROOF VENTS AS SHOWN ON THE ELEVATIONS MEETING I.R.C. R806 AND SHALL BE A NET FREE VENTILATION AREA SHALL NOT BE LESS THAN 1/150TH OF THE AREA OF THE SPACE VENTILATED , EXCEPT THE AREA MAY BE 1/300TH PROVIDED THAT NO LESS THAN 40% AND NO MORE THAN 50% OF THE REQ'D. VENTILATING AREA IS LOCATED IN THE UPPER PORTION (36" MIN. ABOVE CORNICE VENTS OR EAVE) OF THE SPACE TO BE VENTILATED WHILE THE BALANCE OF REQ'D. VENTILATION IS PROVIDED BY EAVES OR CORNICE VENTS.
D. SHINGLES: SEE ELEVATIONS FOR ROOFING STYLE. FOLLOW ALL MANUFACTURER SPECIFICATIONS FOR INSTALLATION.
E. MISCELLANEOUS: 22"X30" ATTIC ACCESS SHALL BE PROVIDED FOR ALL SEPARATE ATTIC AREAS EXCEEDING 30 SQ. FT.. ACCESS LOCATED IN A HALLWAY OR OTHER READILY ACCESSIBLE LOCATION PER IRC R807.1.

8. INSULATION:
A. WALLS: FIBERGLASS BATT OR BLOWN WET CELLULOSE (AS SELECTED BY OWNER) TYPE MINIMUM R-23 (2X6) OR R-19 (2X4) VALUE DEPENDING ON WALL TYPE.
B. BLOWN OR SPRAYED ROOF/CEILING: BLOWN ROCKWOOL OR FIBERGLASS MINIMUM R-49 VALUE. THE THICKNESS OF BLOWN IN OR SPRAYED ROOF/CEILING INSULATION (FIBERGLASS OR CELLULOSE) SHALL BE WRITTEN IN INCHES ON MARKERS THAT ARE INSTALLED AT LEAST ONE FOR EVERY 300 FT THROUGHOUT THE ATTIC SPACE.THE MARKERS SHALL BE AFFIXED TO THE TRUSSES OR JOIST AND MARKED WITH THE MINIMUM INITIAL INSTALLED THICKNESS WITH NUMBERS A MINIMUM OF 1" HIGH. EACH MARKER SHALL FACE THE ATTIC ACCESS OPENING.
C. MISC.: FOAM INSULATE UNDER ALL CONCRETE SILL PLATES, AROUND ALL OUTLET BOXES AND WINDOW AND DOOR FRAMES.
D. WINDOW TAPE: ALL WINDOWS SHALL BE TAPED WITH A WATER BARRIER TAPE TO SEAL AGAINST MOISTURE AND AIR INFILTRATION.
E. PROVIDE INSULATION DEPTH MARKERS EVERY 300 SQ. FT. OF ATTIC AREAS.
F. ALL MATERIALS, SYSTEMS AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THE PROVISIONS OF THIS CODE.
G. CERTIFICATE: A PERMANENT CERTIFICATE SHALL BE POSTED ON OR IN THE ELECTRICAL DISTRIBUTION PANEL. THE CERTIFICATE SHALL BE COMPLETED BY THE BUILDER OR REGISTERED DESIGN PROFESSIONAL. THE CERTIFICATE SHALL LIST THE PREDOMINANT R-VALUES OF INSULATION INSTALLED IN OR ON CEILING/ROOF, WALLS, FOUNDATION (SLAB, BASEMENT WALL, CRAWLSPACE WALL AND /OR FLOOR) AND DUCTS OUTSIDE CONDITIONED SPACES. THE CERTIFICATE SHALL ALSO LIST THE TYPE AND EFFICIENCY OF HEATING, COOLING AND SERVICE WATER HEATING EQUIPMENT.

9. EXTERIOR TRIM:
A. FASCIA: SEE ELEVATIONS (CONFIRM W/ OWNER)
B. SOFFIT: ALUM. W/ VENTILATION OR AS SELECTED BY OWNER.
C. DRIP EDGE: ALUMINUM OR AS SELECTED BY OWNER.
D. DOWNSPOUTS/GUTTERS: ALUMINUM OR AS SELECTED BY OWNER.

10. INTERIOR DETAILS:
A. TRIM: DOOR/WINDOW CASINGS, BASEBOARDS, CHAIR RAIL AND CROWN MOLDING PAINT GRADE EXCEPT GREAT ROOM/KITCHEN/NOOK SHALL BE STAIN GRADE KNOTTY ALDER OR AS SELECTED BY OWNER.
B. CABINETS: ALL CABINETRY SHALL BE HARDWOOD OR AS SELECTED BY OWNER.
C. COUNTERTOPS/BACKSPLASH: GRANITE IN KITCHEN, LAUNDRY, BASEMENT KITCHEN AND IN ALL BATHROOMS.

11. ELECTRICAL:
A. PANEL: MINIMUM 200 AMP SERVICE AND SHALL COMPLY WITH N.E.C. AND LOCAL CODES.
B. WIRING/OUTLETS: SHALL BE AS SHOWN ON THE PLANS AND PER N.E.C. AND LOCAL CODES. LIGHTING, EXHAUST FANS, DOOR CHIME, SMOKE DETECTORS, ETC. SHALL BE SELECTED BY OWNER. ALL SMOKE DETECTORS SHALL BE WIRED IN SERIES WITH BATTERY BACKUP SO THE ALARM IS AUDIBLE IN ALL SLEEPING AREAS PER IRC R314 ATTIC ACCESS AREA SHALL HAVE A SWITCHED LIGHT FIXTURE. CARBON MONOXIDE ALARMS SHALL BE INSTALLED PER IRC 315.
C. MISCELLANEOUS: OUTDOOR FLOOD LIGHTING SHALL BE AS SELECTED BY CONTRACTOR/OWNER.
D. INSTALL WEATHER PROOF BUBBLE COVERS ON ALL EXTERIOR ELECTRICAL OUTLETS.
E. INSTALL 110 VOLT GFI ELECTRICAL OUTLET WITHIN 25 FEET OF A/C UNIT.
F. PROVIDE COMBINATION ARC FAULTS PROTECTION ON ALL BEDROOM LIGHTS, SWITCHES, SMOKE DETECTORS AND RECEPTACLES.
G. PROVIDE A CONCRETE ENCASED ELECTRODE (UFER GROUND) AND WATER PIPE ELECTRODE FOR GROUNDING SYSTEM FOR ELECTRICAL SERVICE. UFER CONNECTIONS MUST BE ACCESSIBLE.

12. HEATING/AIR CONDITIONING:
A. HEATING: MINIMUM 90% ENERGY EFFICIENT GAS FIRED FORCED AIR HEATERS, QUANTITY PER HVAC CALCULATIONS WHICH ARE THE RESPONSIBILITY OF THE HVAC CONTRACTOR. DESIGN AND SELECTION SHALL BE BY HEATING/PLUMBING CONTRACTOR AND CONFIRMED BY OWNER. ALL MANUFACTURERS INSTALLATION INSTRUCTIONS AS WELL AS ALL APPLICABLE LOCAL AND FEDERAL CODES SHALL BE FOLLOWED BY THE CONTRACTOR.
B. AIR CONDITIONING: CENTRAL AIR AIR CONDITIONING UNITS SHALL BE SUPPLIED AND LOCATED ON A CONCRETE PAD LOCATED AWAY FROM DECKS & BEDROOM WINDOWS.
C. DUCTING AND REGISTERS: DESIGN, LOCATION AND TYPE SHALL BE BY PLUMBING/HEATING CONTRACTOR AND SHALL BE CONFIRMED BY CONTRACTOR/OWNER AND SHALL MEET ALL APPLICABLE CODES.
D. MISCELLANEOUS: ALL HEATING IS TO BE PERFORMED BY A LICENSED CONTRACTOR IN KEEPING WITH THE PRACTICES OR THE INTERNATIONAL MECHANICAL CODE.
E. ALL BUILDINGS ARE CONSIDERED TO BE UNUSUALLY TIGHT CONSTRUCTION AND ALL COMBUSTION AIR TO ROOMS SPACES CONTAINING FUEL BURNING APPLIANCES SHALL BE OBTAINED FROM THE OUTDOORS OR FROM SPACES FREELY COMMUNICATING WITH THE OUTDOORS PER IRC M1701.
F. HEATING AND COOLING EQUIPMENT SHALL BE SIZED IN ACCORDANCE WITH ACCA (AIR CONDITIONING CONTRACTORS OF AMERICA) MANUAL J OR OTHER APPROVED CALCULATIONS. DUCT SYSTEMS SERVING HEATING OR COOLING EXHAUST SYSTEMS SHALL BE DESIGNED IN ACCORDANCE WITH ACCA MANUAL D OR OTHER APPROVED METHODS. CALCULATIONS AND DOCUMENTATION IS NOW REQUIRED. IRC M 1301 & M1601
G. CONDENSATE FROM ALL COOLING COILS OR EVAPORATORS SHALL E CONVEYED FROM THE DRAIN PAN OUTLET TO AN APPROVED PLACE OF DISPOSAL. CONDENSATE SHALL NOT DISCHARGE INTO A STREET, ALLEY, OR OTHER AREAS SO AS TO CAUSE A NUISANCE. I.R.C.M1411.3
H. IN ADDITION TO THE REQUIREMENTS OF SECTION 1411.3, A SECONDARY DRAIN OR AUXILIARY DRAIN PAN SHALL BE REQUIRED FOR EACH COOLING OR EVAPORATOR COIL WHERE DAMAGE TO ANY BUILDING COMPONENTS WILL OCCUR AS A RESULT OF OVERFLOW FROM THE EQUIPMENT DRAIN PAN OR STOPPAGE IN THE CONDENSATE DRAIN PIPING. DRAIN PIPING SHALL BE A MINIMUM OF 3/4" (19.1 MM) NOMINAL PIPE SIZE. I.R.C. M1411.3.1
I. RADIANT IN FLOOR HEATING:AN IN-FLOOR RADIANT HEAT SYSTEM SHALL BE INSTALLED (AS SELECTED BY OWNER). THE SYSTEM SHALL BE WIRSBRO OR EQUAL BOILER & TUBING. TUBING SHALL BE CROSSLINK POLYETHYLENE W/BRASS FITTINGS AND MANIFOLD. ONE 83% EFFICIENT BOILER SHALL BE USED IN CONJUNCTION W/(2) 80 GAL. WATER TANKS.
- SLAB INSTALLATION:TUBING SHALL INSTALLED ON 12" CENTERS TIED TO 6X6 WIRE MESH MAT.
- SUB-FLOOR INSTALLATION:(IF APPLICABLE): TUBING SHALL BE STAPLED TO SUBFLOOR ON 6" OR 12" O.C. (DEPENDING ON HEAT LOAD). SHALL BE COVERED W/1-1/2" LIGHTWEIGHT GYPSUM OR 6-1/2 BAG MIX PORTLAND CONCRETE MIX W/PEA GRAVEL (10-12 LBS/SQ. FT. LOADING). AREA OF HARDWOOD SHALL RECEIVE 2X2 DF SLEEPERS AS COORDINATED WITH FLOOR MANUFACTURER. IN LIEU OF CONCRETE FLOOR IN HARDWOOD AREAS, QUICK TRACK SYSTEM (1/2" PLYWOOD PANELS) SHALL BE INSTALLED FOR INSERTION OF TUBING.

13. PLUMBING:
A. SEWER/DRAIN: PLASTIC ABS TYPE.- BACKWATER VALVE IF REQUIRED PER IRC. P3008, WATER PIPE: COPPER SUPPLY TO METER.
B. WATER HEATER: TWO (2) GAS FIRED, GLASS LINED A.O. SMITH SUB CHAMBER OR EQUAL, MINIMUM 50 GALLON EACH.
C. WATER HEATERS SHALL BE ANCHORED OR STRAPPED TO RESIST HORIZONTAL DISPLACEMENT DUE TO EARTHQUAKE MOTION.
D. FIXTURES: ALL FIXTURES SHALL BE SELECTED BY OWNER.
E. MISCELLANEOUS: FAUCETS SELECTED BY OWNER. COLD WATER SUPPLY (NO WATER SOFTENER) TO KITCHEN SINK AND REFRIGERATOR.
F. SHOWERS: ALL SHOWER COMPARTMENTS SHALL HAVE A MIN. FINISHED INTERIOR OF 1024 SQ. IN. AND SHALL ALSO HAVE A MIN. IMPACT RESISTANT SAFETY GLASS SHOWER DOOR WIDTH OF 22". IF GLASS SHOWER ENCLOSURES ARE UTILIZED, GLASS SHALL BE IMPACT RESISTANT SAFETY RATED.
G. APPLIANCES: ALL APPLIANCES ( WATER HEATER, BOILER, STEAM GENERATOR, ETC.) WHICH REQUIRE PRESSURE RELIEF VALVES SHALL BE PROVIDED WITH A FULL SIZE DRAIN EXTENDING TO THE FLOOR DRAIN.
H. SHOWER PAN LINERS MUST EXTEND 3 INCHED ABOVE THE SHOWER DOOR THRESHOLD HEIGHT AND SOLID BLOCKING IS REQUIRED BEHIND ALL LINER LOCATIONS. SHOWER PAN LINERS MUST BE INSTALLED ON BUILT UP FLOORS AND MUST BE INSPECTED.
I. BATHTUBS AND WHIRLPOOL (JETTED TUBS MUST NOW HAVE A TEMPERATURE LIMITING (120 DEGREES) MIX VALVE.
J. BACKWATER VALVES- FIXTURES THAT HAVE FLOOD LEVEL RIMS LOCATED BELOW THE ELEVATION OF THE NEXT UPSTREAM MANHOLE COVER OF THE PUBLIC SEWER SERVING SUCH FIXTURES SHALL BE PROTECTED FROM BACK FLOW OF SEWAGE BY INSTALLING AN APPROVED BACKWATER VALVE. FIXTURES HAVING FLOOD LEVEL RIMS ABOVE THE ELEVATION OF THE NEXT UPSTREAM MANHOLE SHALL NOT DISCHARGE THROUGH THE BACKWATER VALVE. BACKWATER VALVES SHALL BE PROVIDED WITH ACCESS. I.R.C. P3008

14. DOORS:
A. EXTERIOR: SOLID CORE WOOD WITH WEATHER-STRIPPING. EXTERIOR DOORS WITH SIDELIGHTS OR AN INDIVIDUAL FIXED OR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE IS WITHIN A 24" ARC OF THE DOOR IN A CLOSED POSITION & WHOSE BOTTOM EDGE IS LESS THAN 60 INCHES ABOVE THE FLOOR OR WALKING SURFACE SHALL HAVE IMPACT RESISTANT GLAZING PER I.R.C. 308.4 EXTERIOR DOORS TO GARAGE SHALL BE A 20 MIN. FIRE RATED FEATURE WITH A SELF CLOSING FEATURE PER I.R.C. R309.1 (STYLE AND TYPE SELECTED BY OWNER, SEE PLAN DRAWING).
B. INTERIOR: HOLLOW CORE MASONITE AS INDICATED ON THE DOOR SCHEDULE. (STYLE AND TYPE SELECTED BY OWNER, SEE PLAN DRAWINGS).
C. GARAGE: INSULATED OVERHEAD METAL SECTIONAL TYPE MARTIN DOORS OR EQUAL WITH ELECTRICAL/MECHANICAL DOOR OPERATOR/DOOR SHALL BE WIRED ON SEPARATE CIRCUIT TO ALLOW SHUTOFF AT INTERIOR OF HOME. (STYLE AND TYPE SELECTED BY OWNER).
D. PATIO/GLASS DOORS: ALL PATIO/GLASS DOORS SHALL BE SAFETY RATED TEMPERED GLASS. (STYLE AND TYPE SELECTED BY OWNER).
E. PROVIDE CORROSION RESISTANT METAL L FLASHING OVER ALL EXTERIOR DOORS INCLUDING GARAGE DOORS WITHOUT NAILING FINS OR FLANGES.

15. WINDOWS/SKYLIGHTS:
A. MARVIN, ANDERSON OR EQUAL SUPPLIED BY BMC (COLOR AND STYLE BY OWNER). MANUFACTURERS DETAILS SHALL BE FOLLOWED FOR ROUGH FRAMING AND INSTALLATION (SEE PLAN DRAWINGS).
B. GLAZING TO BE DOUBLE ARGON GAS FILLED WITH LOW E RATING OR AS SELECTED BY OWNER. ALL WINDOWS LOWER THAN 18" FROM THE FLOOR SHALL BE IMPACT RESISTANT SAFETY GLASS.
C. SCREENS SHALL BE NYLON FABRIC.
D. WINDOW WELLS: WINDOW WELL SHALL MEET I.R.C. R310.2 WITH A CLEAR HORIZONTAL AREA OF 9 SQ. FT. AND A MINIMUM WIDTH OF 3'-0". WINDOW WELL WITH A DEPTH OF 44" OR GREATER SHALL BE PROVIDED WITH A STAIR OR AN APPROVED LADDER.
E. EGRESS: ALL BEDROOM WINDOWS SHALL HAVE A WINDOW OPENING OF 44" MAX. FROM THE FINISHED FLOOR, HAVE WINDOW GLASS OPENINGS OF 20" MIN. CLEAR WIDTH, AND 24" MIN. CLEAR HEIGHT. WITH A MIN. NET CLEAR OPENING OF 5.7 SQ. FT. EGRESS PER I.R.C. R310.1
F. WINDOWS OVER ALL BATHTUBS AND SHOWERS SHALL BE IMPACT RESISTANT SAFETY GLASS AS WELL AS WINDOWS WITHIN 24" OF A DOOR.
G. GLAZING IN WALLS ENCLOSING STAIRWAY LANDINGS OR WITHIN 60 " OF THE TOP AND BOTTOM OF STAIRWAYS WHERE THE BOTTOM EDGE OF THE GLASS IS LESS THAN 60 " ABOVE THE WALKING SURFACE SHALL HAVE IMPACT RESISTANT GLAZING PER I.R.C. R308.4.6 & R308.4.7
H. FLASH AND CAULK ALL EXTERIOR WINDOWS AND DOORS AS PER MANUFACTURERS INSTALLATION INSTRUCTIONS.
I. PROVIDE 9 INCH FLASHINGS FOR WINDOWS AS PER MANUFACTURER INSTALLATION INSTRUCTIONS.
J. WINDOWS WITH SILL HEIGHTS LESS THAN 18 INCHES ABOVE THE FINISHED FLOOR AND WHEN THE EXTERIOR SILL HEIGHT IS GREATER THAN 6 FEET ABOVE GRADE MUST BE FIXED WINDOWS OF LABELED SAFETY GLAZING OR MUST HAVE 36 INCH HIGH GUARD WITH 4" MAX. OPENINGS TO PROTECT PERSON(S) FROM FALLING THROUGH (R613.2)
K. PROVIDE CORROSION RESISTANT METAL L FLASHING OVER ALL EXTERIOR DOORS INCLUDING GARAGE DOORS WITHOUT NAILING FINS OR FLANGES.

16. WALL FINISH:
A. WALL PAINT SHALL BE LATEX BASED SEALER, PRIMER AND 2 COATS OF ALKYD FINISH. (ALL PAINT AND COLORS SHALL BE CONFIRMED BY OWNER)

17. FIREPLACES/ STOVES:
A. FIREPLACES SHALL CONSIST OF NATURAL GAS, DIRECT VENT, SEALED COMBUSTION, METAL FIREBOX AS MANUFACTURED BY HEAT-N-GLO MODEL 6000XT OR EQUAL OR AS SELECTED BY OWNER. MANUFACTURERS INSTRUCTIONS AND ALL LOCAL CODES SHALL BE FOLLOWED FOR INSTALLATION.
B. ACTUAL FIREBOX OPENING/ FRAMING PER CONTRACTOR/ OWNER & FIREBOX SELECTED CONTACT ENGINEER FOR APPROVAL FOR SHEER WALL OPENING

18. HANDRAILINGS:
A. REQUIRED GUARDS ON OPEN SIDES OF STAIRWAYS, RAISED FLOOR AREAS, BALCONIES AND PORCHES SHALL HAVE INTERMEDIATE RAILS OR ORNAMENTAL CLOSURES WHICH DO NOT ALLOW PASSAGE OF A SPHERE 4 INCHES (102 MM) OR MORE IN DIAMETER. (IRC. R312)
B. EXTERIOR: HAND RAILING SHALL BE POWDER COATED STEEL RAILING SYSTEM (OR AS SELECTED BY OWNER).
C. INTERIOR: HAND RAILING SHALL BE KNOTTY ALDER RAIL AND NEWELS WITH WROUGHT IRON BALUSTERS (STAIN AND FINISH OR AS SELECTED BY OWNER).

19. FINISH COLORS:
A. CARPET: AREAS TO BE CARPETED SHALL BE SHOWN ON PLANS (CARPET AND PADDING SELECTED BY OWNER).
B. WOOD FLOOR: AREAS TO BE COVERED WITH HARDWOOD SHALL SHOWN ON PLANS (STYLE AND TYPE TO BE SELECTED BY THE OWNER).
C. TILE/STONE: AREAS TO BE COVERED WITH TILE/NATURAL STONE SHALL BE SHOWN ON PLANS (STYLE AND TYPE TO BE SELECTED BY THE OWNER).

20. APPLIANCES:
A. ALL APPLIANCES SHALL BE SELECTED BY OWNER.
B. BATHROOM EXHAUST FAN DUCTS MUST CONTINUE AND DISCHARGE DIRECTLY OUTSIDE THE STRUCTURE. CLOSE PROXIMITY TO ATTIC VENTS OR TO SOFFIT AREAS ARE SPECIFICALLY PROHIBITED. ALL EXHAUST DUCTS MUST NOW CONNECT TO AN OPENING WITH PROPER SCREEN FOR TERMINATIONS IN WALL AREAS OR TO AN APPROVED THROUGH THE ROOF DISCHARGE FITTING INSTALLED AS NOT TO BE BLOCKED OR STOPPED BY SNOW OR ICE.

GENERAL DRAWING NOTES: HABITATIONS MAKES EVERY EFFORT TO PRESENT ACCURATE & RELIABLE INFORMATION, HOWEVER IT DOES NOT ENDORSE, APPROVE, OR CERTIFY THE INFORMATION PROVIDED BY OTHERS, NOR DOES HABITATIONS GUARANTEE IT'S ACCURACY OR COMPLETENESS. USE OF THIS INFORMATION IS VOLUNTARY AND RELIANCE ON IT SHOULD ONLY BE UNDERTAKEN AFTER CAREFUL REVIEW AND INDEPENDENT VERIFICATION OF ITS ACCURACY AND COMPLETENESS. THE CONTRACTOR/ OWNER/ TRADE CONTRACTORS SHALL ASSUME ALL RISKS FOR THE USE OF THE INFORMATION CONTAINED HEREIN. UNDER NO CIRCUMSTANCES WILL HABITATIONS , IT'S OFFICERS, EMPLOYEES OR AGENTS BE LIABLE FOR YOUR USE, MISUSE, REFERENCE TO, OR RELIANCE ON ANY OF THE INFORMATION PROPOSED OR THAT RESULT FROM MISTAKES, ERRORS, OMISSIONS, INTERPRETATIONS, OR DEFECTS.
1. FLOOR PLAN INTERIOR DIMENSIONS ARE TO INSIDE OF UNFINISHED (STUD) WALLS (UNFINISHED WALL THICKNESS EQUALS 3 1/2"), SQUARE FOOTAGE IS DETERMINED TO THE OUTSIDE OF ALL EXTERIOR WALLS IN EVERY LOCATION WHERE THE FLOOR JOISTS PROJECT FROM THE FOUNDATION.
2. FLOOR PLAN EXTERIOR DIMENSIONS ARE TO THE OUTSIDE FACE OF THE STUDS. (EXCLUDING SHEATHING).
3. AN ATTEMPT HAS BEEN MADE TO DESIGN TO FEDERAL, STATE AND LOCAL BUILDING CODES AND ORDINANCES HOWEVER THE CONTRACTOR/ OWNER SHALL HAVE RESPONSIBILITY TO INSURE THAT ALL APPLICABLE FEDERAL , STATE & LOCAL BUILDING CODES AND ORDINANCES ARE MET. THE CONTRACTOR/ OWNER SHALL CHECK AND VERIFY ALL DIMENSIONS AND SPECIFICATIONS AND ASSUME RESPONSIBILITY FOR ALL DAMAGES OR STRUCTURAL FAILURES DUE TO ANY OMISSIONS OR ERRORS IN THE DESIGN AND/OR USE OF THESE DRAWINGS/SPECIFICATIONS.
4. ELECTRICAL, PLUMBING AND HVAC DETAILS ARE NOT SHOWN. THE GENERAL CONTRACTOR SHALL HAVE THE RESPONSIBILITY TO INSURE THAT SUBCONTRACTORS FOLLOW ALL APPLICABLE CODES.
5. STRUCTURAL ROOF, FLOOR AND WALL FRAMING DETAILS ARE SHOWN FOR INFORMATION ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FRAMING TO MEET STRUCTURAL REQUIREMENTS OF ALL APPLICABLE CODES.
6. CABINET DETAILS ARE NOT SHOWN. DESIGN, STYLE AND COLOR SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR/OWNER.
7. SITE PLAN IS SHOWN FOR INFORMATION ONLY. OWNER /CONTRACTOR SHALL HAVE RESPONSIBILITY TO DETERMINE GRADES AND FINAL PLACEMENT AND ELEVATIONS OF FOOTINGS/FOUNDATIONS AND TO MEET ALL LOCAL ZONING CODES/ORDINANCES.
8. A TRASH DUMPSTER AND PORTA-POTTY SHALL BE PROVIDED AT ALL NEW CONSTRUCTION SITES. CAN NOT BE PLACED IN STREET OR ACROSS SIDEWALK AND PARKSTRIP.
9. A CERTIFICATE MUST BE POSTED IN OR BY THE ELECTRICAL PANEL OR FURNACE ROOM LISTING THE R VALUES OF THE INSULATION INSTALLED IN THE WALLS, CEILINGS, FOUNDATION WALLS, SLAB, CRAWLSPACE AND DUCTS OUTSIDE CONDITIONED SPACES. WINDOWS U-FACTORS AND SOLAR HEAT GAIN CONSTANTS MUST ALSO BE LISTED AND SHOWN. THE TYPE AND EFFICIENCY OF THE FURNACE, BOILER, WATER HEATER AND AIR CONDITIONING EQUIPMENT SHALL ALSO BE LISTED.

NOMENCLATURE

| ABBREVIATION | DESCRIPTION | ABBREVIATION | DESCRIPTION |
|---|---|---|---|
| ALUM | ALUMINUM | LIN | LINEN |
| A/R | AS REQUIRED | MFG | MANUFACTURER |
| AV | AUDIO VIDEO | MECH | MECHANICAL |
| BSMNT | BASEMENT | MIN | MINIMUM |
| BRG. | BEARING | | |
| BTR | BETTER | MOD | MODIFIED |
| BKS | BOOKS | MTR | MOTOR |
| BI | BUILT IN | NTS | NOT TO SCALE |
| CAB | CABINET | OC | ON CENTER |
| CLG | CEILING | PAN | PANTRY |
| CV | CENTRAL VACUUM | PSI | POUNDS PER SQUARE INCH |
| CONC. | CONCRETE | PLCS | PLACES |
| CTR | COUNTER | PL | POINT LOAD |
| DW | DISH WASHER | PDR | POWDER ROOM |
| DBL | DOUBLE | REF | REFRIGERATOR |
| DF | DOUGLAS FIR | R & S | ROD AND SHELF |
| DN | DOWN | RB | ROOF BEAM |
| ELEV. | ELEVATION | SHLVS | SHELVES |
| EQ | EQUAL | SPECS | SPECIFICATIONS |
| FP | FIREPLACE | SURF. | SURFACE |
| FB | FLOOR BEAM | SUSP. | SUSPENDED |
| FTG | FOOTING | SQ. | SQUARE |
| FDN | FOUNDATION | T & G | TONGUE AND GROOVE |
| FT. | FEET | T.O.F | TOP OF FOUNDATION |
| FURN. | FURNACE | TYP | TYPICAL |
| GYP. | GYPSUM | UNCL | UNDER COUNTER LIGHTING |
| HVAC | HEATING, VENTILATION, AIR CONDITIONING | UNO | UNLESS NOTED OTHERWISE |
| HT/HGT | HEIGHT | WIC | WALK-IN-CLOSET |
| IRC | INTERNATIONAL RESIDENTIAL CODE | WO | WALL OVEN |
| LAUN | LAUNDRY | WH | WATER HEATER |

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HABITATIONS
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SHEET TITLE: GENERAL NOTES & SPECIFICATIONS

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465

Exhibit A-Approved Plans

# SITE PLAN

ASPEN DRIVE
LOT #42-R
POWDER MOUNTAIN WEST PHASE 2
EDEN CITY, WEBER COUNTY, UTAH

SCALE: 1" = 10'-0"
Area = 9,559 Sq. Ft. = 0.22 ACRE

| HEIGHT RESTRICTION CALCS | |
|---|---|
| HIGHEST GRADE | 8282 |
| LOWEST GRADE | 8265 |
| PEAK HEIGHT | 8308.5 |
| DIFFERENCE #1 | 25.47 |
| DIFFERENCE #2 | 41.47 |
| TOTAL | 66.94 |
| DIVIDED BY 2 | 33.47 |
| HEIGHT RESTRICTION FROM AVERAGE FINISHED GRADE | 35' |
| ACTUAL HEIGHT FROM AVERAGE FINISHED GRADE | 33.47' |

PLEASE NOTE:

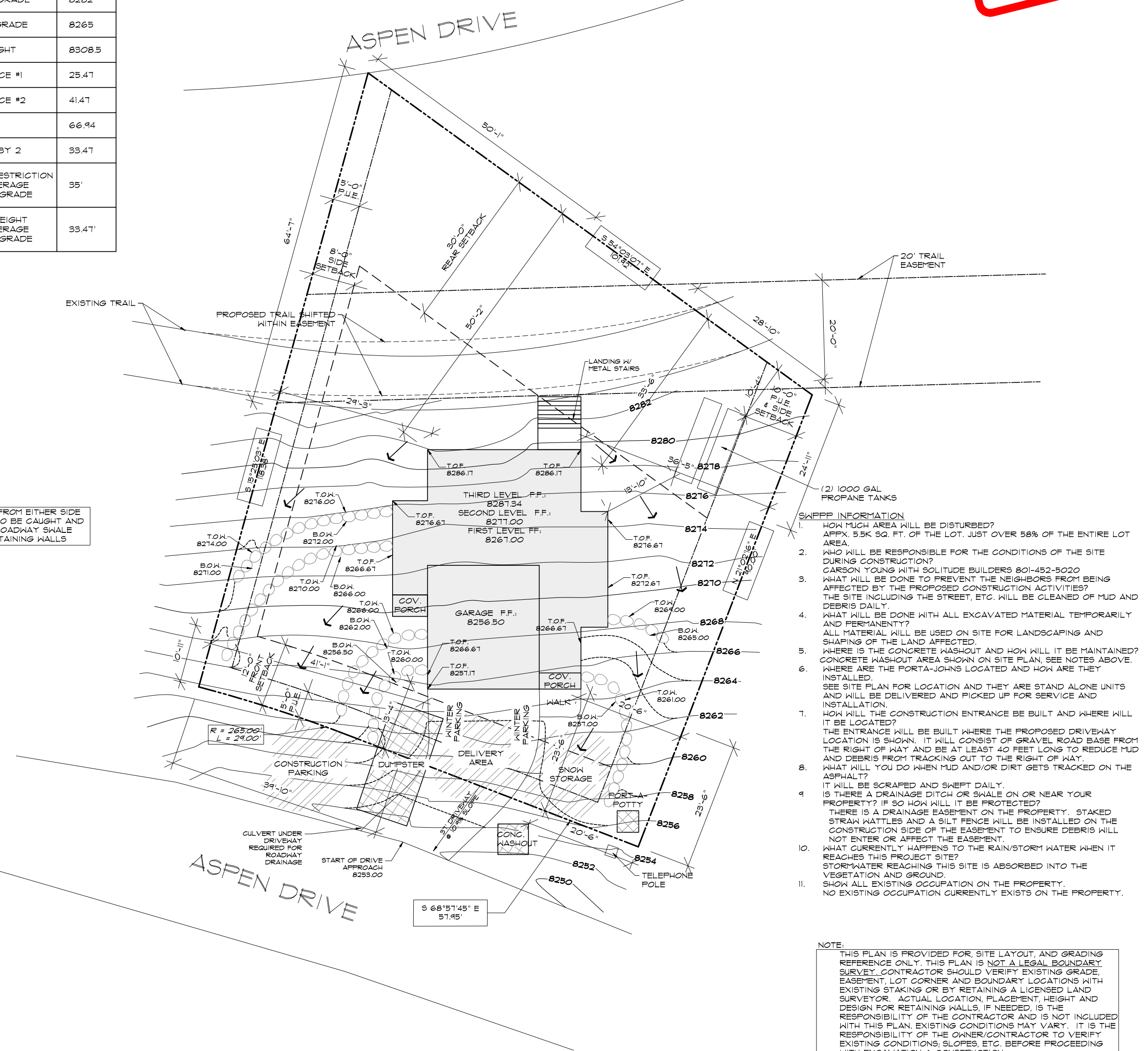
1. SITE PLAN IS SHOWN FOR INFORMATION ONLY. OWNER /CONTRACTOR SHALL HAVE RESPONSIBILITY TO DETERMINE GRADES AND FINAL PLACEMENT AND ELEVATIONS OF FOOTINGS/FOUNDATIONS AND SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL STATE, NATIONAL, AND LOCAL BUILDING CODES & ORDINANCES.
2. THIS SITE PLAN IS A REPRESENTATION OF CONCRETE FOUNDATIONAL BUILDING FOOTPRINT ONLY. ALL SETBACK INFORMATION SHOWN IS TO CONCRETE FOUNDATION WALLS ONLY. SITE PLAN DOES NOT INDICATE THE LOCATION OF ROOF OVERHANGS OR CANTILEVERS (WALL POPOUTS OR FLOOR OVERHANGS) OR OTHER ARCHITECTURAL ELEMENTS THAT MAY PENETRATE THE PROPERTY SETBACKS OR EASEMENTS. THE PLAN COUNTY, CITY OR OTHER JURISDICTION REVIEWER, CONTRACTOR AND OWNER SHALL REVIEW ALL PLAN SUBMITTAL DRAWINGS (FLOOR PLANS, ELEVATIONS, DETAILS, ETC...) IN CONJUNCTION WITH THE SITE PLAN TO IDENTIFY ANY PROPOSED WALL CANTILEVERS OR OTHER FEATURES THAT MAY ENCROACH INTO SETBACKS AND SHALL REPORT ANY CONCERNS TO THE DESIGNER PRIOR TO EXCAVATION AND/OR CONSTRUCTION.

LINETYPE LEGEND

- PROPERTY LINE
- SETBACK LINE
- EASEMENT LINE
- HOME FOOTPRINT
- PROPOSED CONT.
- 10' CONT. LINE
- 2' CONT. LINE
- DIRECTIONAL DRAINAGE ARROWS

NOTE:
ALL DRAINAGE FROM EITHER SIDE OF THE HOUSE TO BE CAUGHT AND PIPED TO THE ROADWAY SWALE BEHIND ANY RETAINING WALLS

1. ALL STORM WATER AND DIRT WILL BE KEPT ON SITE DURING CONSTRUCTION UNTIL FINAL LANDSCAPING IS DONE.
2. THE GRADE AWAY FROM FOUNDATION WALLS SHALL FALL A MINIMUM OF 6 INCHES WITHIN THE FIRST 10 FEET (5%)
3. STREET, CURB AND GUTTER WILL BE INSPECTED AND CLEANED OF ALL MUD AND DIRT AT THE END OF EVERY DAY.
4. STRAW WATTLES (OR EQUIVALENT) TO BE PLACED AND MAINTAINED AROUND ANY STORM DRAIN INLET ADJACENT TO OR IMMEDIATELY DOWNSTREAM FROM SITE DURING CONSTRUCTION.
5. BERMS OR SWALES MAY BE REQUIRED ALONG PROPERTY LINES TO PREVENT STORM WATER FLOW ONTO ADJACENT LOTS. FINAL GRADING SHALL BLEND WITH ADJACENT LOTS.
6. ALL REAR DRAINAGE TO BE RETAINED ON THE PROPERTY.
7. FIXTURES THAT HAVE FLOOD LEVEL RIMS LOCATED BELOW THE ELEVATION OF THE NEXT UPSTREAM MANHOLE COVER OF THE PUBLIC SEWER SERVING SUCH FIXTURES SHALL BE PROTECTED FROM BACK FLOW OF SEWAGE BY INSTALLING AN APPROVED BACKWATER VALVE. FIXTURES HAVING FLOOD LEVEL RIMS ABOVE THE ELEVATION OF THE NEXT UPSTREAM MANHOLE SHALL NOT DISCHARGE THROUGH THE BACKWATER VALVE. BACKWATER VALVES SHALL BE PROVIDED WITH ACCESS.
8. LONG-TERM DRAINAGE CONTROL BY STANDARD RESIDENTIAL LANDSCAPING, INCLUDING GRASS, TREES AND BUSHES AND AN AUTOMATIC SPRINKLER SYSTEM.




SWPPP INFORMATION

1. HOW MUCH AREA WILL BE DISTURBED?
   APPX. 5.5K SQ. FT. OF THE LOT. JUST OVER 58% OF THE ENTIRE LOT AREA.
2. WHO WILL BE RESPONSIBLE FOR THE CONDITIONS OF THE SITE DURING CONSTRUCTION?
   CARSON YOUNG WITH SOLITUDE BUILDERS 801-452-5020
3. WHAT WILL BE DONE TO PREVENT THE NEIGHBORS FROM BEING AFFECTED BY THE PROPOSED CONSTRUCTION ACTIVITIES?
   THE SITE INCLUDING THE STREET, ETC. WILL BE CLEANED OF MUD AND DEBRIS DAILY.
4. WHAT WILL BE DONE WITH ALL EXCAVATED MATERIAL TEMPORARILY AND PERMANENTY?
   ALL MATERIAL WILL BE USED ON SITE FOR LANDSCAPING AND SHAPING OF THE LAND AFFECTED.
5. WHERE IS THE CONCRETE WASHOUT AND HOW WILL IT BE MAINTAINED?
   CONCRETE WASHOUT AREA SHOWN ON SITE PLAN, SEE NOTES ABOVE.
6. WHERE ARE THE PORTA-JOHNS LOCATED AND HOW ARE THEY INSTALLED.
   SEE SITE PLAN FOR LOCATION AND THEY ARE STAND ALONE UNITS AND WILL BE DELIVERED AND PICKED UP FOR SERVICE AND INSTALLATION.
7. HOW WILL THE CONSTRUCTION ENTRANCE BE BUILT AND WHERE WILL IT BE LOCATED?
   THE ENTRANCE WILL BE BUILT WHERE THE PROPOSED DRIVEWAY LOCATION IS SHOWN. IT WILL CONSIST OF GRAVEL ROAD BASE FROM THE RIGHT OF WAY AND BE AT LEAST 40 FEET LONG TO REDUCE MUD AND DEBRIS FROM TRACKING OUT TO THE RIGHT OF WAY.
8. WHAT WILL YOU DO WHEN MUD AND/OR DIRT GETS TRACKED ON THE ASPHALT?
   IT WILL BE SCRAPED AND SWEPT DAILY.
9. IS THERE A DRAINAGE DITCH OR SWALE ON OR NEAR YOUR PROPERTY? IF SO HOW WILL IT BE PROTECTED?
   THERE IS A DRAINAGE EASEMENT ON THE PROPERTY. STAKED STRAW WATTLES AND A SILT FENCE WILL BE INSTALLED ON THE CONSTRUCTION SIDE OF THE EASEMENT TO ENSURE DEBRIS WILL NOT ENTER OR AFFECT THE EASEMENT.
10. WHAT CURRENTLY HAPPENS TO THE RAIN/STORM WATER WHEN IT REACHES THIS PROJECT SITE?
    STORMWATER REACHING THIS SITE IS ABSORBED INTO THE VEGETATION AND GROUND.
11. SHOW ALL EXISTING OCCUPATION ON THE PROPERTY.
    NO EXISTING OCCUPATION CURRENTLY EXISTS ON THE PROPERTY.


CONCRETE WASTE MANAGEMENT

NOTES:

1. EXCESS AND WASTE CONCRETE SHALL NOT BE WASHED INTO THE STREET OR INTO A DRAINAGE SYSTEM.
2. FOR WASHOUT OF CONCRETE AND MORTAR PRODUCTS, A DESIGNATED CONTAINMENT FACILITY OF SUFFICIENT CAPACITY TO RETAIN LIQUID AND SOLID WASTE SHALL BE PROVIDED ON SITE. THIS DISCHARGE AREA MUST BE LINED WITH AN IMPERMEABLE BARRIER.
3. SLURRY FROM CONCRETE AND ASPHALT SAW CUTTING SHALL BE VACUUMED OR CONTAINED, DRIED, PICKED UP, AND DISPOSED OF PROPERLY.

NOTE:
THIS PLAN IS PROVIDED FOR SITE LAYOUT, AND GRADING REFERENCE ONLY. THIS PLAN IS NOT A LEGAL BOUNDARY SURVEY. CONTRACTOR SHOULD VERIFY EXISTING GRADE, EASEMENT, LOT CORNER AND BOUNDARY LOCATIONS WITH EXISTING STAKING OR BY RETAINING A LICENSED LAND SURVEYOR. ACTUAL LOCATION, PLACEMENT, HEIGHT AND DESIGN FOR RETAINING WALLS, IF NEEDED, IS THE RESPONSIBILITY OF THE CONTRACTOR AND IS NOT INCLUDED WITH THIS PLAN. EXISTING CONDITIONS MAY VARY. IT IS THE RESPONSIBILITY OF THE OWNER/CONTRACTOR TO VERIFY EXISTING CONDITIONS, SLOPES, ETC. BEFORE PROCEEDING WITH EXCAVATION & CONSTRUCTION.

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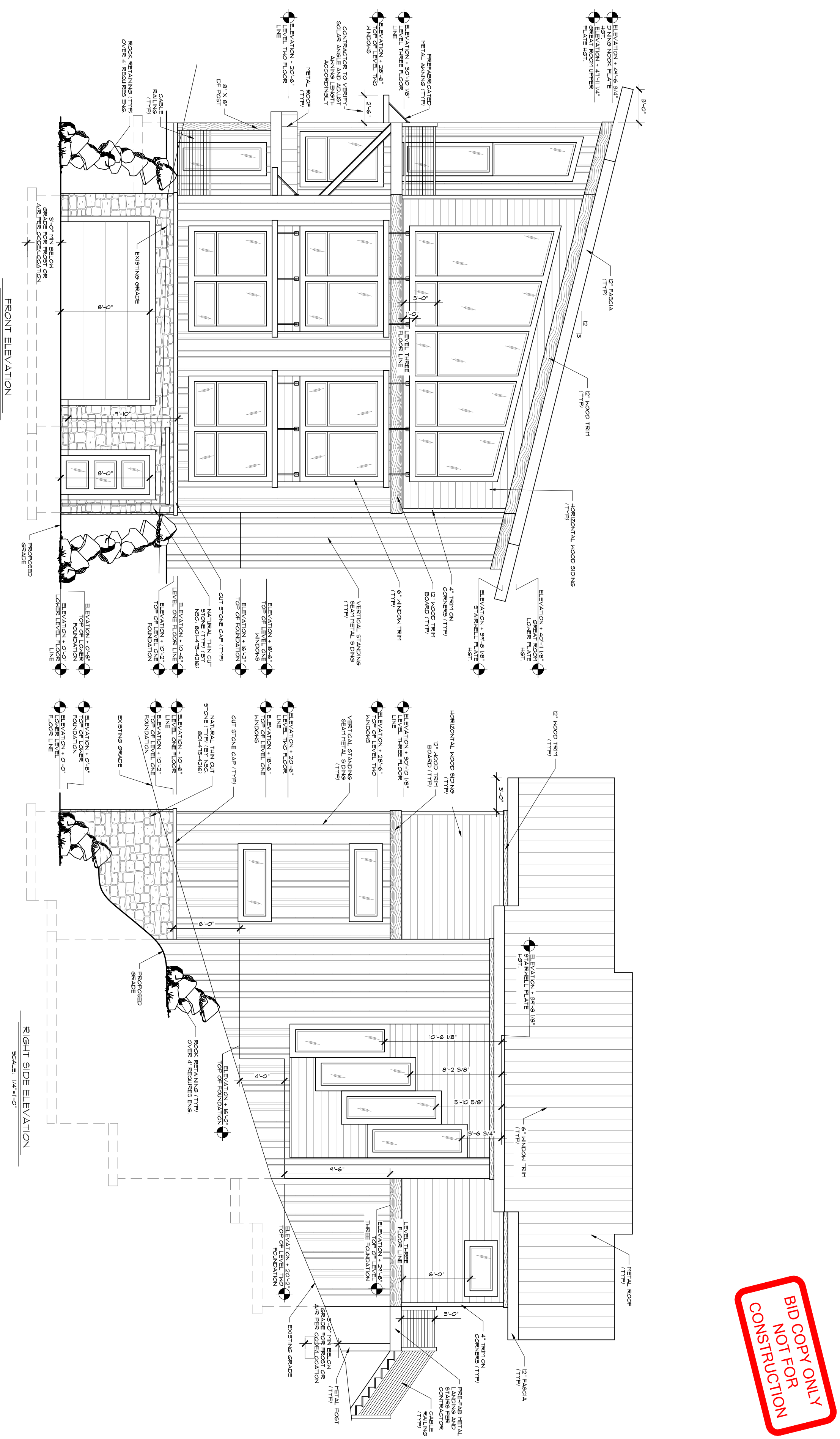
SHEET TITLE: SITE PLAN

24X36 SHEET: 1" = 10'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 3 of 15

Exhibit A-Approved Plans




FRONT / RIGHT SIDE ELEVATIONS

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 4 OF 15

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

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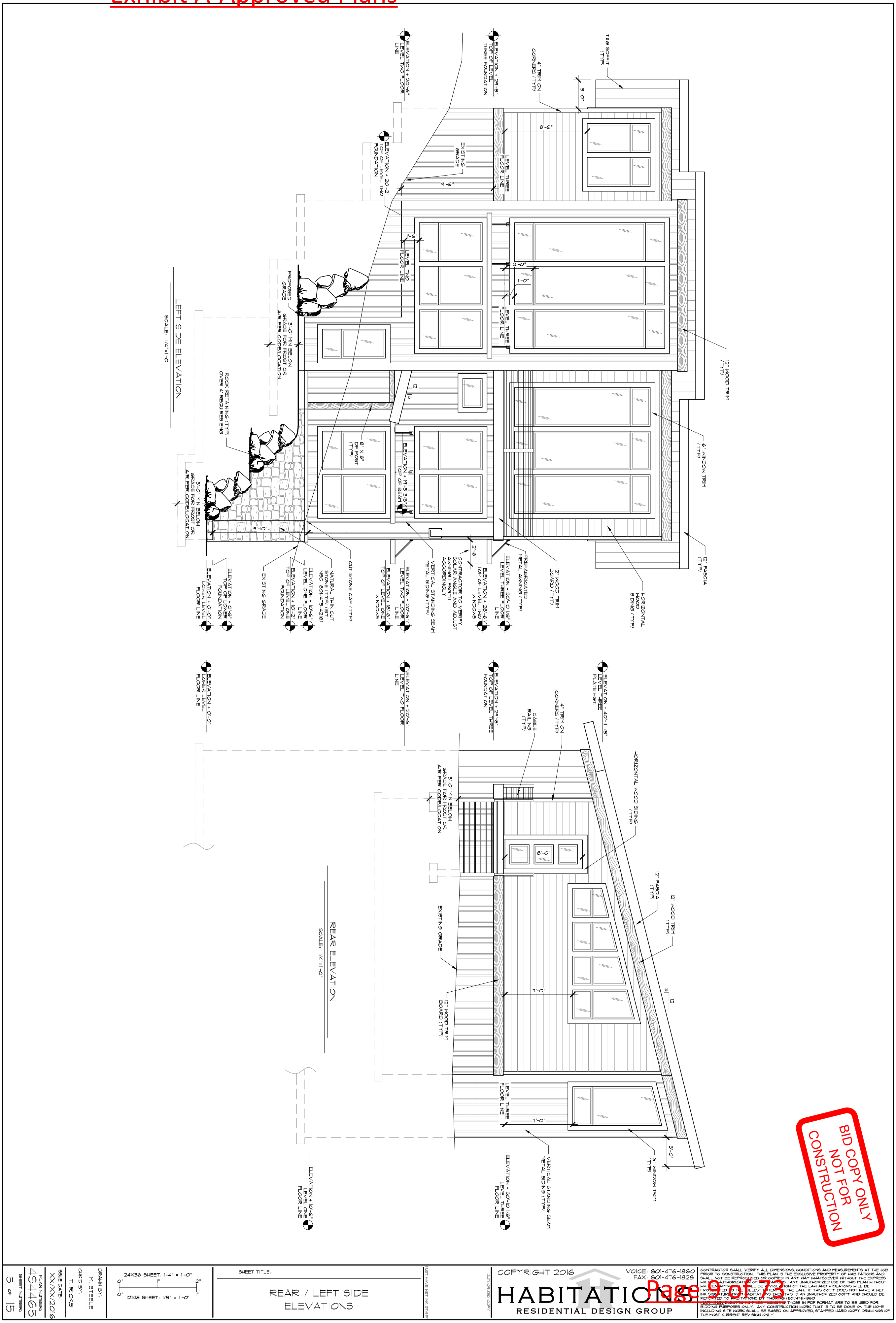
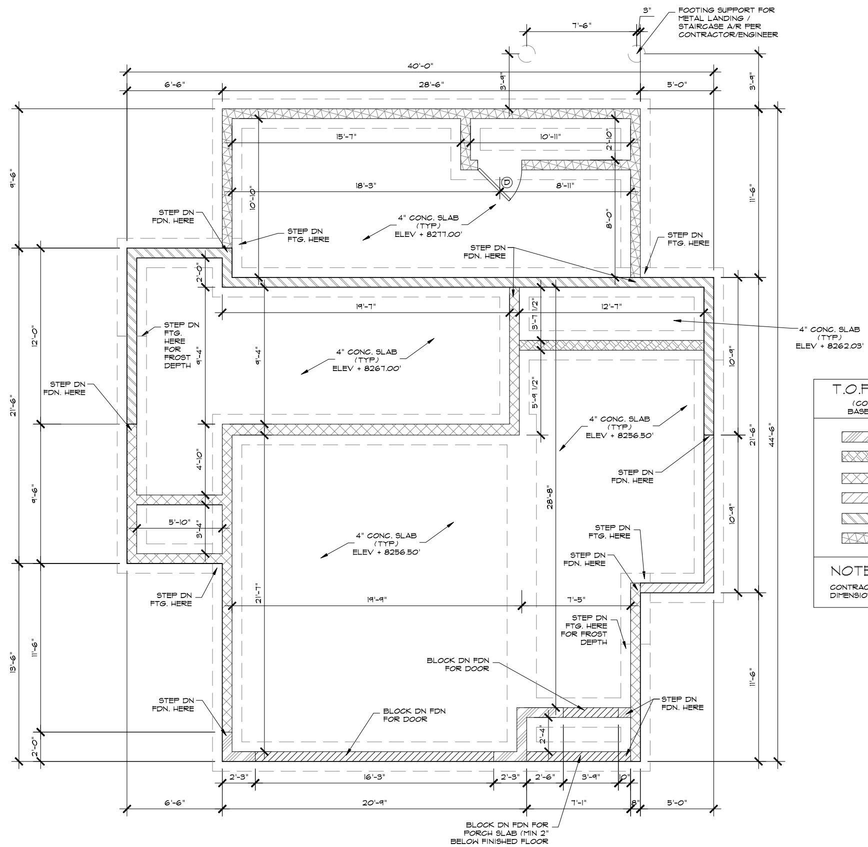


Exhibit A-Approved Plans




## T.O.F. ELEVATIONS

(CONTRACTOR TO VERIFY BASED ON SITE CONDITIONS)

- ELEV + 8257.17'
- ELEV + 8261.70'
- ELEV + 8266.67'
- ELEV + 8272.67'
- ELEV + 8276.67'
- ELEV + 8286.17'

NOTE:

CONTRACTOR TO VERIFY ALL FIELD DIMENSIONS PRIOR TO CONSTRUCTION.

## IMPORTANT NOTE:

- THE CONTRACTOR IS REQUIRED TO CONSULT WITH A GEO-TECHNICAL ENGINEER TO VERIFY ALLOWABLE SOIL BEARING PRESSURE, AND THAT EXPANSIVE SOILS DO NOT EXIST IN THE VICINITY OF CONSTRUCTION PRIOR TO INSTALLING THE FOUNDATION. ALL FINDINGS ARE TO BE REPORTED TO THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING.
- THE FOOTING/ FOUNDATION PLAN INFORMATION PRESENTED HEREIN IS "FOR INFORMATION ONLY." THE STRUCTURAL ENGINEER SHALL BE RESPONSIBLE FOR FOOTING/ FOUNDATION PLAN DETAILS AND REQUIREMENTS. ELEVATIONS OF FOOTINGS OR TOP OF FOUNDATIONS SHOULD BE DETERMINED BY THE GENERAL CONTRACTOR BASED ON SITE CONDITIONS AND OWNER DESIRES.
- FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION
- FOUNDATION MUST BE INSULATED WITH A MIN. OF R-10 RIGID INSULATION.

SEE PAGE 7 FOR WINDOW AND DOOR SCHEDULE

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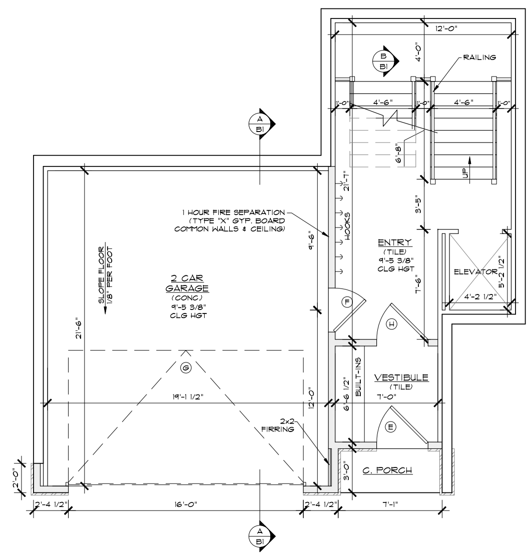
FOOTING / FOUNDATION PLAN

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 6 OF 15

Exhibit A-Approved Plans




BASEMENT FLOOR PLAN

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

LOWER LEVEL 365 SQ. FT.
GARAGE 463 SQ. FT.

| DOOR SCHEDULE | | |
|---|---|---|
| ID | QTY | DESCRIPTIONS |
| A | 1 | 2'-4" X 8'-0" PKT DOOR |
| B | 4 | 2'-6" X 8'-0" PKT DOOR |
| C | 5 | 2'-6" X 8'-0" INTERIOR 2 PANEL DOOR |
| D | 8 | 3'-0" X 8'-0" INTERIOR 2 PANEL DOOR |
| E | 3 | 3'-0" X 8'-0" EXTERIOR GLASS DOOR |
| F | 1 | 3'-0" X 8'-0" 20 MIN FIRE RATED W/ SELF CLOSER |
| G | 1 | 18'-0" X 8'-0" INSULATED OVERHEAD DOOR |
| H | 3 | 3'-0" X 8'-0" EXTERIOR 2 PANEL DOOR |
| I | 2 | 6'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| J | 1 | 5'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| K | 1 | 3'-0" X 8'-0" EXTERIOR FULL GLASS DOOR W/ 7'-6" TRAPEZOID TRANSOM |

NOTE: UNLESS OTHERWISE SPECIFIED ALL INTERIOR DOORS SHALL HAVE PINE JAMBS. ALL EXTERIOR DOORS SHALL HAVE PINE JAMBS, DEAD BOLTS AND WEATHER-STRIPPING. ALL GLASS ENTRY & PATIO DOORS SHALL HAVE LOW-E, DOUBLE GLAZED, TEMPERED SAFETY GLASS.

| WINDOW SCHEDULE | | |
|---|---|---|
| ID | QTY | DESCRIPTIONS |
| 1 | 16 | 4'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 2 | 4 | 2'-0" x 8'-0" FIXED (TEMPERED) |
| 3 | 1 | 3'-0" X 2'-0" AWNING |
| 4 | 1 | 4'-0" X 6'-0" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 5 | 1 | 4'-0" X 7'-1 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 6 | 1 | 4'-0" X 8'-3" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 7 | 1 | 4'-0" X 9'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 8 | 1 | 4'-0" X 10'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 9 | 1 | 4'-0" X 2'-0" FIXED |
| 10 | 3 | 4'-0" X 10'-0" FIXED W/ 2'-0 TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 11 | 3 | 4'-0" X 11'-6" FIXED W/ 2'-0" TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 12 | 1 | 3'-0" X 1'-9" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 13 | 1 | 3'-0" X 2'-7 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 14 | 1 | 3'-0" X 3'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 15 | 1 | 4'-0" X 4'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 16 | 1 | 4'-0" X 7'-2 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 17 | 1 | 3'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 18 | 2 | 3'-0" X 4'-6" FIXED W/ 2'-0" TRANSOM |
| 19 | 2 | 6'-0" X 2'-0" FIXED |

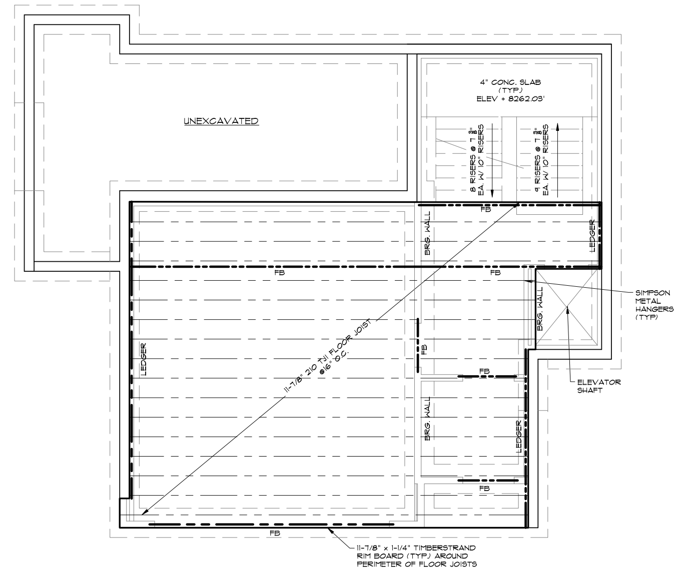
NOTE: UNLESS OTHERWISE NOTED ALL WINDOWS SHALL BE ALUMINUM CLAD WOOD BY MARVIN OR VINYL SUPPLIED BY BMC WEST OR EQUAL. MANUFACTURERS DIRECTIONS SHALL BE FOLLOWED FOR INSTALLATION AND FRAMING DIMENSIONS. ALL WINDOWS SHALL BE DOUBLE GLAZED AND LOW E GLASS. SEE ELEVATIONS TO DETERMINE STYLE AND CONFIGURATION.

WALL SCHEDULE

2"X4" FRAMED WALL
2"X6" FRAMED WALL
THIN CUT NATURAL STONE

1. NOTE: UNLESS OTHERWISE SPECIFIED ALL ANGLED WALLS SHALL BE IN 45° INCREMENTS.
2. WALL SIZES SHALL BE GOVERNED IN ALL CASES BY THE WALL HEIGHT SCHEDULE (SEE FRAMING SHEETS).

NOTE:
VERIFY ALL FIELD DIMENSIONS PRIOR TO CONSTRUCTION.
BUILT-IN CABINETRY SHALL BE SELECTED BY OWNER.




LEVEL ONE FLOOR FRAMING PLAN

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

IMPORTANT NOTE:

- THE FLOOR FRAMING PLAN INFORMATION PRESENTED HEREIN IS "FOR INFORMATION ONLY." THE ACTUAL FLOOR FRAMING PLAN SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL ENGINEER. HABITATIONS MAKES NO GUARANTEE TO THE PLAN ACCURACY OR COMPLETENESS AND ASSUMES NO LIABILITY FOR SUCH.

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BASEMENT LEVEL 365 SQ. FT.
GARAGE 463 SQ. FT.



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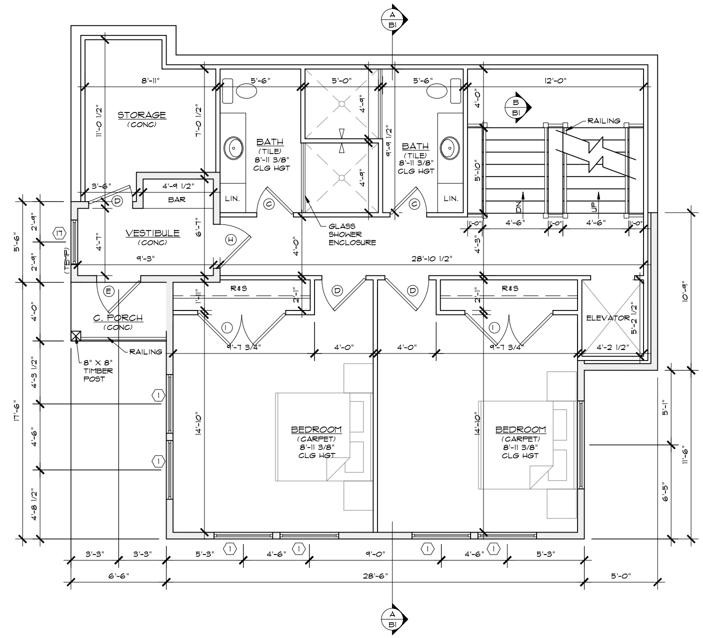
Page 11 of 73

SHEET TITLE:
BASEMENT LEVEL FLOOR PLAN /
LEVEL ONE FLOOR FRAMING PLAN

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 7 of 15

Exhibit A-Approved Plans




LEVEL ONE FLOOR PLAN

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

LEVEL ONE 1163 SQ. FT.

DOOR SCHEDULE

| ID | QTY | DESCRIPTIONS |
|---|---|---|
| A | 1 | 2'-4" X 8'-0" PKT DOOR |
| B | 4 | 2'-6" X 8'-0" PKT DOOR |
| C | 5 | 2'-6" X 8'-0" INTERIOR 2 PANEL DOOR |
| D | 8 | 3'-0" X 8'-0" INTERIOR 2 PANEL DOOR |
| E | 3 | 3'-0" X 8'-0" EXTERIOR GLASS DOOR |
| F | 1 | 3'-0" X 8'-0" 20 MIN FIRE RATED W/ SELF CLOSER |
| G | 1 | 18'-0" X 8'-0" INSULATED OVERHEAD DOOR |
| H | 3 | 3'-0" X 8'-0" EXTERIOR 2 PANEL DOOR |
| I | 2 | 6'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| J | 1 | 5'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| K | 1 | 3'-0" X 8'-0" EXTERIOR FULL GLASS DOOR W/ 7'-6" TRAPEZOID TRANSOM |

NOTE: UNLESS OTHERWISE SPECIFIED ALL INTERIOR DOORS SHALL HAVE PINE JAMBS. ALL EXTERIOR DOORS SHALL HAVE PINE JAMBS, DEAD BOLTS AND WEATHER-STRIPPING. ALL GLASS ENTRY & PATIO DOORS SHALL HAVE LOW-E, DOUBLE GLAZED, TEMPERED SAFETY GLASS.

WINDOW SCHEDULE

| ID | QTY | DESCRIPTIONS |
|---|---|---|
| 1 | 16 | 4'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 2 | 4 | 2'-0" x 8'-0" FIXED (TEMPERED) |
| 3 | 1 | 3'-0" X 2'-0" AWNING |
| 4 | 1 | 4'-0" X 6'-0" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 5 | 1 | 4'-0" X 7'-1 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 6 | 1 | 4'-0" X 8'-3" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 7 | 1 | 4'-0" X 9'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 8 | 1 | 4'-0" X 10'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 9 | 1 | 4'-0" X 2'-0" FIXED |
| 10 | 3 | 4'-0" X 10'-0" FIXED W/ 2'-0 TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 11 | 3 | 4'-0" X 11'-6" FIXED W/ 2'-0" TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 12 | 1 | 3'-0" X 1'-9" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 13 | 1 | 3'-0" X 2'-7 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 14 | 1 | 3'-0" X 3'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 15 | 1 | 4'-0" X 4'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 16 | 1 | 4'-0" X 7'-2 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 17 | 1 | 3'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 18 | 2 | 3'-0" X 4'-6" FIXED W/ 2'-0" TRANSOM |
| 19 | 2 | 6'-0" X 2'-0" FIXED |

NOTE: UNLESS OTHERWISE NOTED ALL WINDOWS SHALL BE ALUMINUM CLAD WOOD BY MARVIN OR VINYL SUPPLIED BY BMC WEST OR EQUAL. MANUFACTURERS DIRECTIONS SHALL BE FOLLOWED FOR INSTALLATION AND FRAMING DIMENSIONS. ALL WINDOWS SHALL BE DOUBLE GLAZED AND LOW E GLASS. SEE ELEVATIONS TO DETERMINE STYLE AND CONFIGURATION.

WALL SCHEDULE

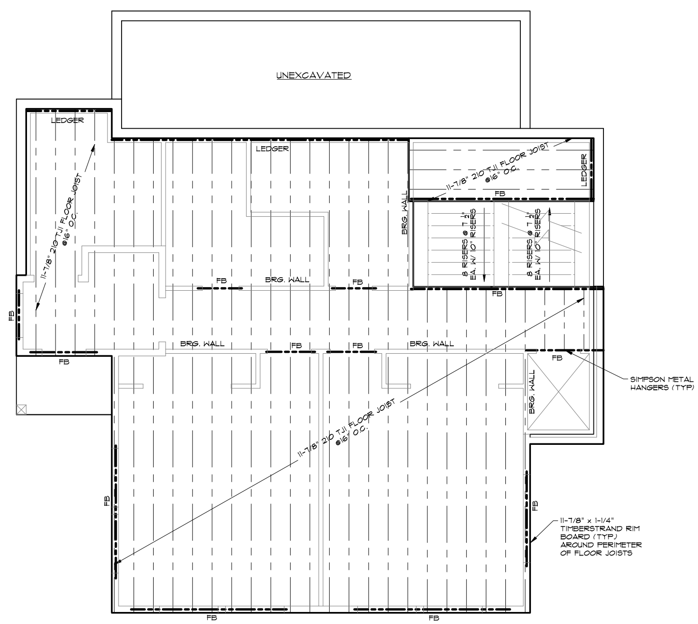
- 2"X4" FRAMED WALL
- 2"X6" FRAMED WALL
- THIN CUT NATURAL STONE

1. NOTE: UNLESS OTHERWISE SPECIFIED ALL ANGLED WALLS SHALL BE IN 45° INCREMENTS.
2. WALL SIZES SHALL BE GOVERNED IN ALL CASES BY THE WALL HEIGHT SCHEDULE (SEE FRAMING SHEETS).

NOTE:

VERIFY ALL FIELD DIMENSIONS PRIOR TO CONSTRUCTION.

BUILT-IN CABINETRY SHALL BE SELECTED BY OWNER.




LEVEL TWO FLOOR FRAMING PLAN

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

IMPORTANT NOTE:

- THE FLOOR FRAMING PLAN INFORMATION PRESENTED HEREIN IS "FOR INFORMATION ONLY." THE ACTUAL FLOOR FRAMING PLAN SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL ENGINEER. HABITATIONS MAKES NO GUARANTEE TO THE PLAN ACCURACY OR COMPLETENESS AND ASSUMES NO LIABILITY FOR SUCH.

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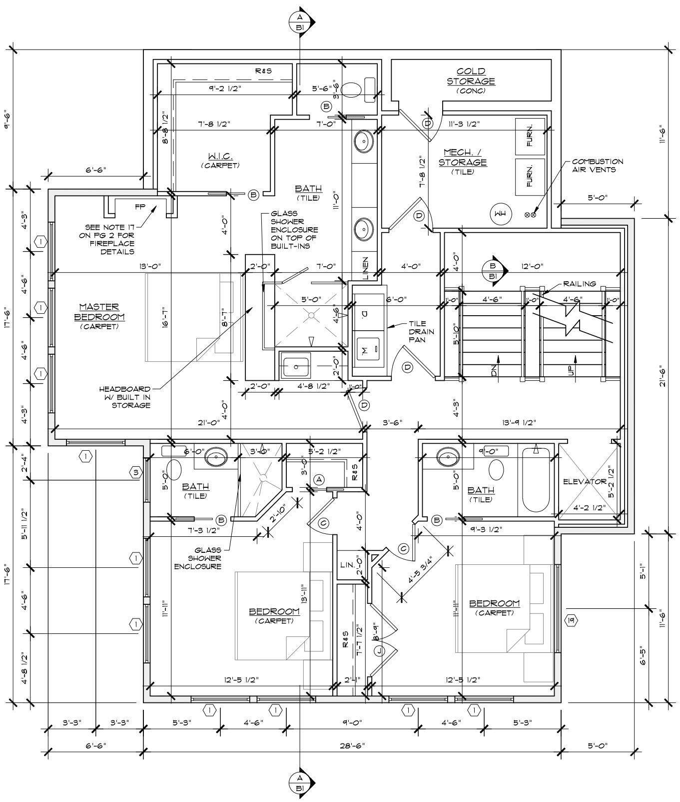
SHEET TITLE:
LEVEL ONE FLOOR PLAN /
LEVEL TWO FLOOR FRAMING

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 7 of 15

LOWER FLOOR 1163 SQ. FT.

Exhibit A-Approved Plans




LEVEL TWO FLOOR PLAN

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

LEVEL TWO 1448 SQ. FT.

| DOOR SCHEDULE | | |
|---|---|---|
| ID | QTY | DESCRIPTIONS |
| A | 1 | 2'-4" X 8'-0" PKT DOOR |
| B | 4 | 2'-6" X 8'-0" PKT DOOR |
| C | 5 | 2'-6" X 8'-0" INTERIOR 2 PANEL DOOR |
| D | 8 | 3'-0" X 8'-0" INTERIOR 2 PANEL DOOR |
| E | 3 | 3'-0" X 8'-0" EXTERIOR GLASS DOOR |
| F | 1 | 3'-0" X 8'-0" 20 MIN FIRE RATED W/ SELF CLOSER |
| G | 1 | 18'-0" X 8'-0" INSULATED OVERHEAD DOOR |
| H | 3 | 3'-0" X 8'-0" EXTERIOR 2 PANEL DOOR |
| I | 2 | 6'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| J | 1 | 5'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| K | 1 | 3'-0" X 8'-0" EXTERIOR FULL GLASS DOOR W/ 1'-6" TRAPEZOID TRANSOM |

NOTE: UNLESS OTHERWISE SPECIFIED ALL INTERIOR DOORS SHALL HAVE PINE JAMBS. ALL EXTERIOR DOORS SHALL HAVE PINE JAMBS, DEAD BOLTS AND WEATHER-STRIPPING. ALL GLASS ENTRY & PATIO DOORS SHALL HAVE LOW-E, DOUBLE GLAZED, TEMPERED SAFETY GLASS.

| WINDOW SCHEDULE | | |
|---|---|---|
| ID | QTY | DESCRIPTIONS |
| 1 | 16 | 4'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 2 | 4 | 2'-0" x 8'-0" FIXED (TEMPERED) |
| 3 | 1 | 3'-0" X 2'-0" AWNING |
| 4 | 1 | 4'-0" X 6'-0" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 5 | 1 | 4'-0" X 7'-1 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 6 | 1 | 4'-0" X 8'-3" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 7 | 1 | 4'-0" X 9'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 8 | 1 | 4'-0" X 10'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 9 | 1 | 4'-0" X 2'-0" FIXED |
| 10 | 3 | 4'-0" X 10'-0" FIXED W/ 2'-0 TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 11 | 3 | 4'-0" X 11'-6" FIXED W/ 2'-0" TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 12 | 1 | 3'-0" X 1'-9" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 13 | 1 | 3'-0" X 2'-7 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 14 | 1 | 3'-0" X 3'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 15 | 1 | 4'-0" X 4'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 16 | 1 | 4'-0" X 7'-2 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 17 | 1 | 3'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 18 | 2 | 3'-0" X 4'-6" FIXED W/ 2'-0" TRANSOM |
| 19 | 2 | 6'-0" X 2'-0" FIXED |

NOTE: UNLESS OTHERWISE NOTED ALL WINDOWS SHALL BE ALUMINUM CLAD WOOD BY MARVIN OR VINYL SUPPLIED BY BMC WEST OR EQUAL. MANUFACTURERS DIRECTIONS SHALL BE FOLLOWED FOR INSTALLATION AND FRAMING DIMENSIONS. ALL WINDOWS SHALL BE DOUBLE GLAZED AND LOW E GLASS. SEE ELEVATIONS TO DETERMINE STYLE AND CONFIGURATION.

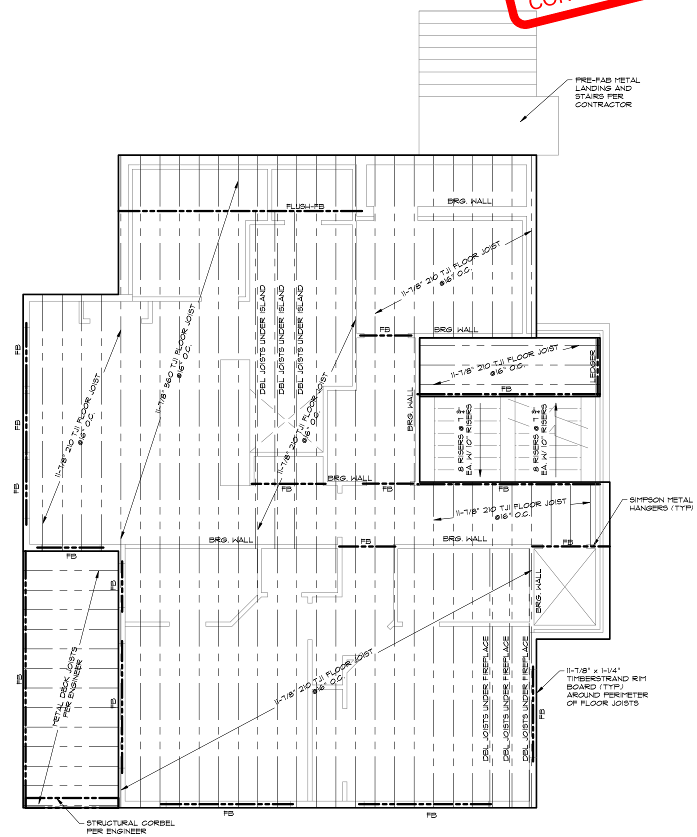
WALL SCHEDULE

- 2"X4" FRAMED WALL
- 2"X6" FRAMED WALL
- THIN CUT NATURAL STONE

1. NOTE: UNLESS OTHERWISE SPECIFIED ALL ANGLED WALLS SHALL BE IN 45° INCREMENTS.
2. WALL SIZES SHALL BE GOVERNED IN ALL CASES BY THE WALL HEIGHT SCHEDULE (SEE FRAMING SHEETS).

NOTE:

VERIFY ALL FIELD DIMENSIONS PRIOR TO CONSTRUCTION.
BUILT-IN CABINETRY SHALL BE SELECTED BY OWNER.




LEVEL THREE FLOOR FRAMING PLAN

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

IMPORTANT NOTE:

- THE FLOOR FRAMING PLAN INFORMATION PRESENTED HEREIN IS "FOR INFORMATION ONLY." THE ACTUAL FLOOR FRAMING PLAN SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL ENGINEER. HABITATIONS MAKES NO GUARANTEE TO THE PLAN ACCURACY OR COMPLETENESS AND ASSUMES NO LIABILITY FOR SUCH.

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SECOND LEVEL 1448 SQ. FT.



VOICE: 801-476-1860
FAX: 801-476-1828



HABITATIONS
RESIDENTIAL DESIGN GROUP

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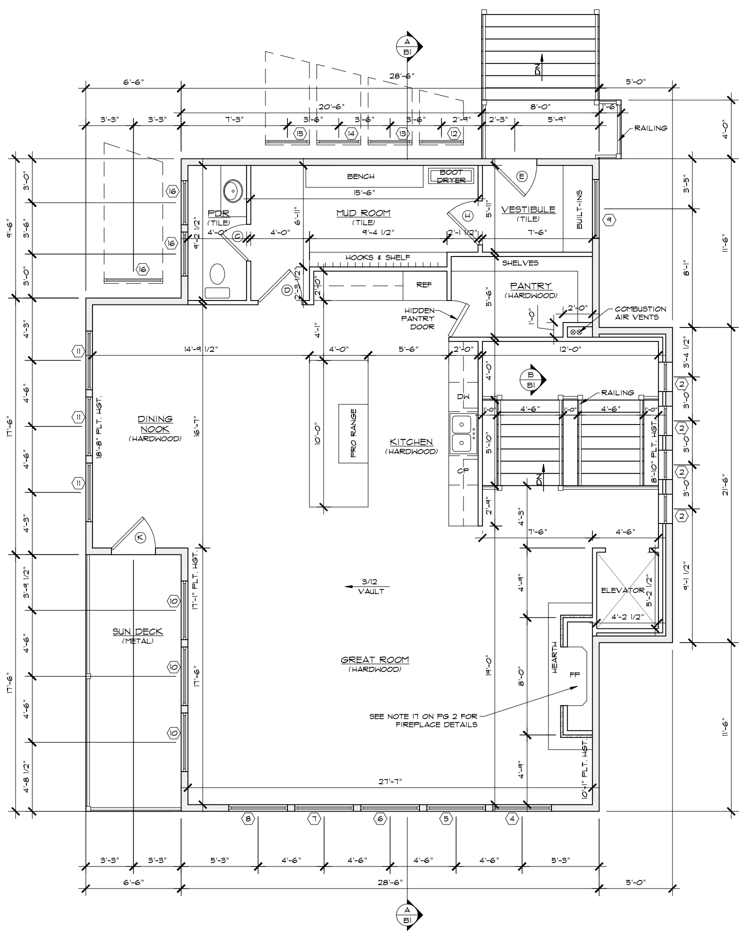
MUST HAVE WET INK STAMP

SHEET TITLE:
LEVEL TWO FLOOR PLAN /
LEVEL THREE FLOOR FRAMING

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 9 OF 15

# Exhibit A-Approved Plans




LEVEL THREE FLOOR PLAN

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

LEVEL THREE 1489 SQ. FT.

DOOR SCHEDULE

| ID | QTY | DESCRIPTIONS |
|---|---|---|
| A | 1 | 2'-4" X 8'-0" PKT DOOR |
| B | 4 | 2'-6" X 8'-0" PKT DOOR |
| C | 5 | 2'-6" X 8'-0" INTERIOR 2 PANEL DOOR |
| D | 8 | 3'-0" X 8'-0" INTERIOR 2 PANEL DOOR |
| E | 3 | 3'-0" X 8'-0" EXTERIOR GLASS DOOR |
| F | 1 | 3'-0" X 8'-0" 20 MIN FIRE RATED W/ SELF CLOSER |
| G | 1 | 18'-0" X 8'-0" INSULATED OVERHEAD DOOR |
| H | 3 | 3'-0" X 8'-0" EXTERIOR 2 PANEL DOOR |
| I | 2 | 6'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
| J | 1 | 5'-0" X 8'-0" INTERIOR 2 PANEL DBL. DOOR |
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WINDOW SCHEDULE

| ID | QTY | DESCRIPTIONS |
|---|---|---|
| 1 | 16 | 4'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 2 | 4 | 2'-0" x 8'-0" FIXED (TEMPERED) |
| 3 | 1 | 3'-0" X 2'-0" AWNING |
| 4 | 1 | 4'-0" X 6'-0" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 5 | 1 | 4'-0" X 7'-1 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 6 | 1 | 4'-0" X 8'-3" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
| 7 | 1 | 4'-0" X 9'-4 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TEMPERED TRANSOM |
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| 9 | 1 | 4'-0" X 2'-0" FIXED |
| 10 | 3 | 4'-0" X 10'-0" FIXED W/ 2'-0 TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 11 | 3 | 4'-0" X 11'-6" FIXED W/ 2'-0" TOP TRANSOM & 2'-0" BOTTOM TEMPERED TRANSOM |
| 12 | 1 | 3'-0" X 1'-9" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 13 | 1 | 3'-0" X 2'-7 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 14 | 1 | 3'-0" X 3'-6" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
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| 16 | 1 | 4'-0" X 7'-2 1/2" FIXED TRAPEZOID W/ 2'-0" BOTTOM TRANSOM |
| 17 | 1 | 3'-0" X 4'-6" FIXED W/ 2'-0" BOTTOM TRANSOM |
| 18 | 2 | 3'-0" X 4'-6" FIXED W/ 2'-0" TRANSOM |
| 19 | 2 | 6'-0" X 2'-0" FIXED |

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WALL SCHEDULE

- 2"X4" FRAMED WALL
- 2"X6" FRAMED WALL
- THIN CUT NATURAL STONE

1. NOTE: UNLESS OTHERWISE SPECIFIED ALL ANGLED WALLS SHALL BE IN 45° INCREMENTS.
2. WALL SIZES SHALL BE GOVERNED IN ALL CASES BY THE WALL HEIGHT SCHEDULE (SEE FRAMING SHEETS).

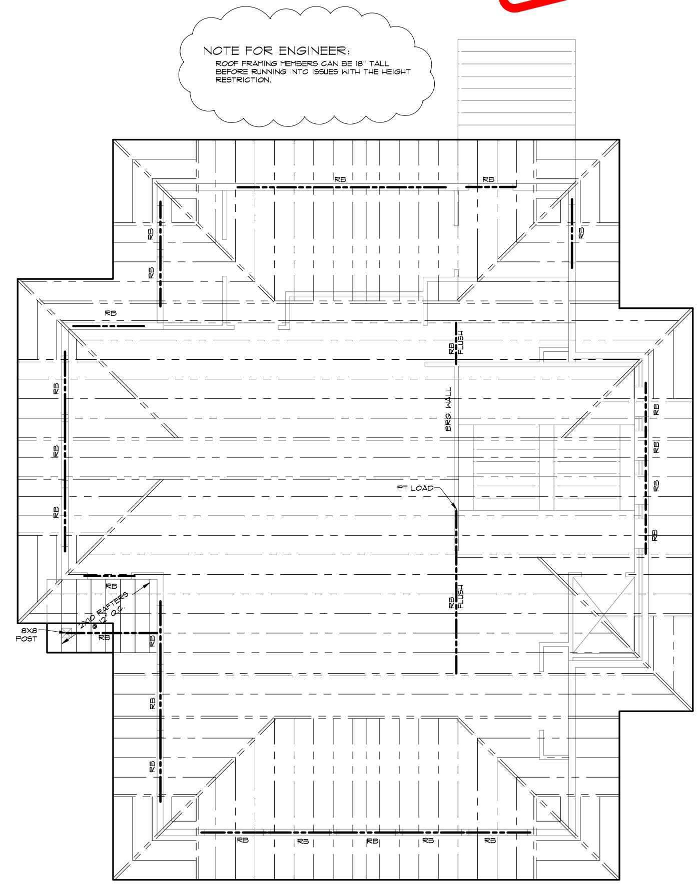
NOTE:

VERIFY ALL FIELD DIMENSIONS PRIOR TO CONSTRUCTION.

BUILT-IN CABINETRY SHALL BE SELECTED BY OWNER.

NOTE FOR ENGINEER:

ROOF FRAMING MEMBERS CAN BE 18" TALL BEFORE RUNNING INTO ISSUES WITH THE HEIGHT RESTRICTION.




ROOF FRAMING PLAN

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

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IMPORTANT NOTE:

- THE ROOF FRAMING PLAN INFORMATION PRESENTED HEREIN IS "FOR INFORMATION ONLY." THE ACTUAL ROOF FRAMING PLAN DESIGN SHALL BE THE RESPONSIBILITY OF THE ROOF TRUSS MANUFACTURER AND STRUCTURAL ENGINEER. HABITATIONS MAKES NO GUARANTEE TO THE PLAN ACCURACY OR COMPLETENESS AND ASSUMES NO LIABILITY FOR SUCH. THE GENERAL CONTRACTOR/ ROOFING CONTRACTOR SHALL DETERMINE RAIN GUTTERS/ DOWN SPOUT REQUIREMENTS AND LOCATION OF SUCH AS WELL AS AREAS OF ROOF CRICKETS AND ROOF DRAINAGE/ FLASHING AND MEMBRANE LOCATIONS TO ADDRESS DRAINAGE ISSUES AT THE LOCATIONS.
- FEILD VERIFY ALL DIMENSIONS PRIOR TO TRUSS MANUFACTURING.
- THE TRUSS MANUFACTURER IS REQUIRED TO CONTACT THE OWNER/CONTRACTOR IF THERE ARE ANY ISSUES DISCOVERED ON THE ROOF FRAMING PLAN DURING THE TRUSS DESIGN, PRIOR TO TRUSS MANUFACTURE. NO CHANGES WILL BE ALLOWED TO BE MADE TO THE FOLLOWING; ROOM CEILING HEIGHTS, VAULTS, INTERIOR OR EXTERIOR PITCHES OR FASCIA HEIGHTS WITHOUT RECEIVING APPROVAL.
- TRUSSES SHALL BE DESIGNED FROM APPROVED HARD COPY PLANS WITH THE RED AUTHORIZATION STAMP ONLY. THE OWNER/CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ALL SUBCONTRACTORS AND SUPPLIERS INCLUDING THE TRUSS MANUFACTURER HAVE THE MOST CURRENT AND UP TO DATE PLANS IN STAMPED AND APPROVED HARD COPY FORMAT PRIOR TO COMMENCING WITH CONSTRUCTION. FIELD MEASUREMENTS SHALL BE MADE AND VERIFIED PRIOR TO THE FINAL TRUSS DESIGN COMPLETION AND MANUFACTURE. TRUSSES SHALL NOT BE DESIGNED OR CONSTRUCTED FROM ELECTRONIC OR PDF TYPE DOCUMENTS.

THIRD LEVEL 1489 SQ. FT.




VOICE: 801-476-1860
FAX: 801-476-1828




HABITATIONS
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SHEET TITLE:
LEVEL THREE FLOOR PLAN / ROOF FRAMING PLAN

24X36 SHEET: 1/4" = 1'-0"
12X18 SHEET: 1/8" = 1'-0"

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: 11 of 15

Exhibit A-Approved Plans

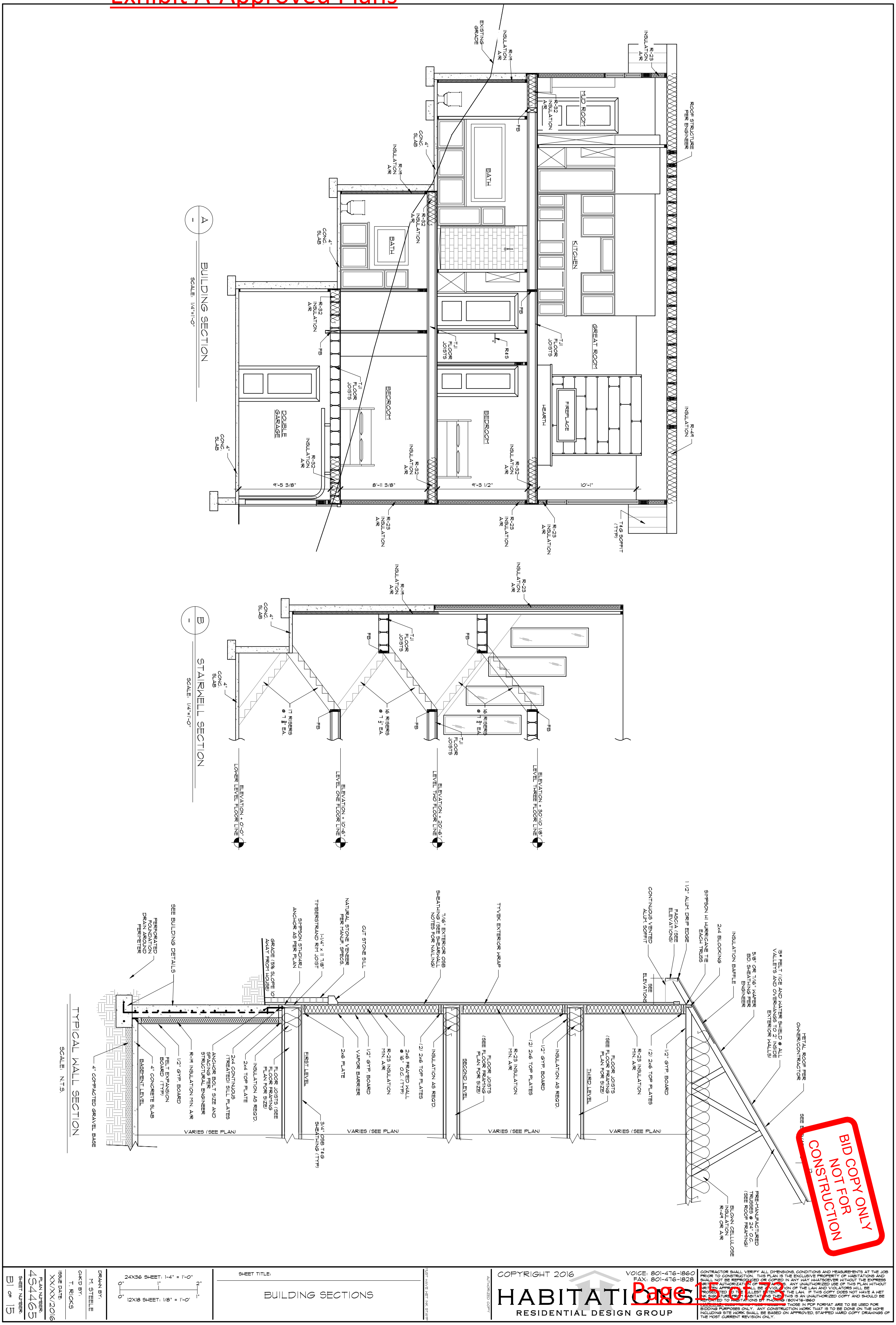
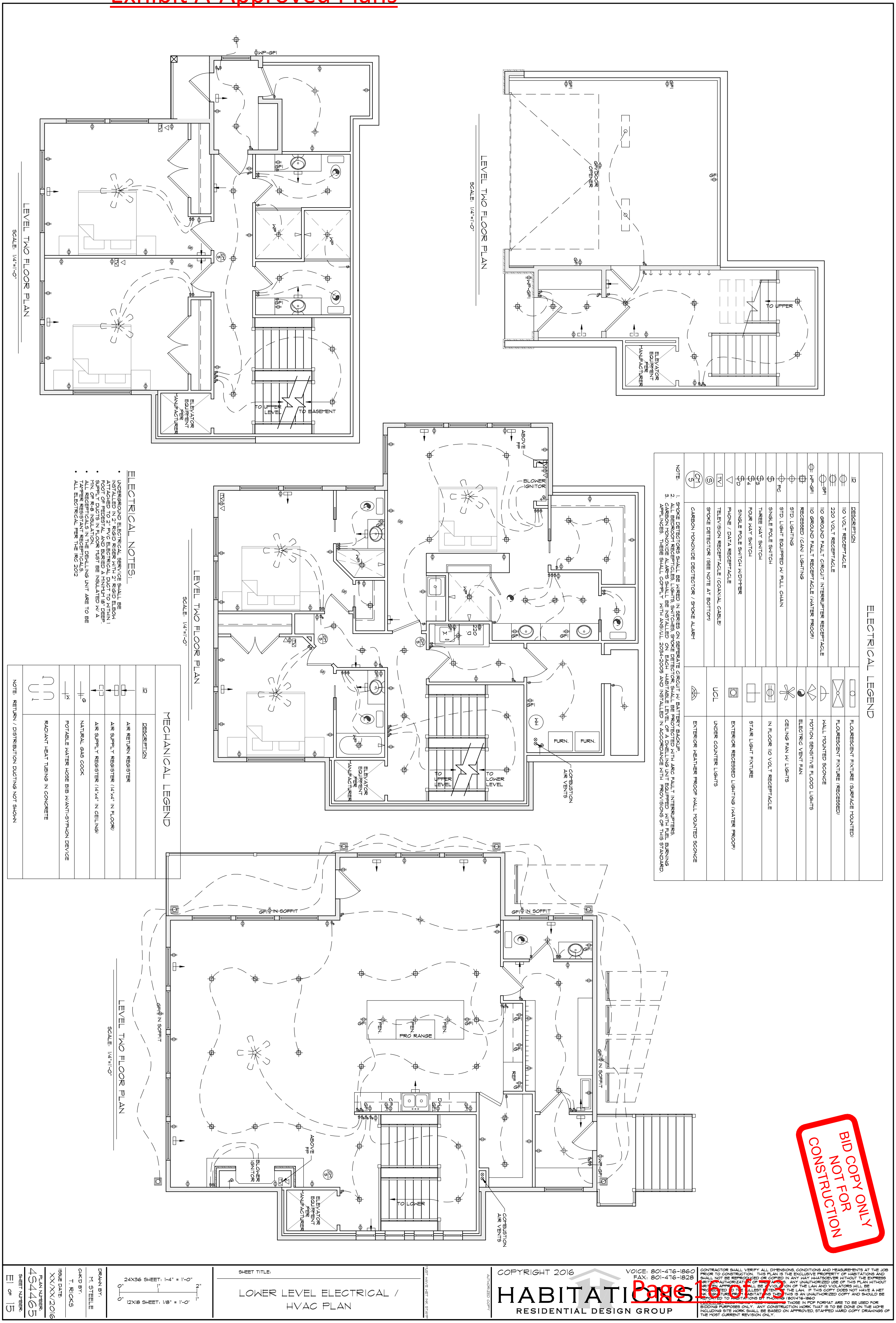
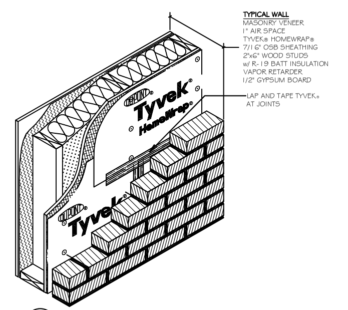


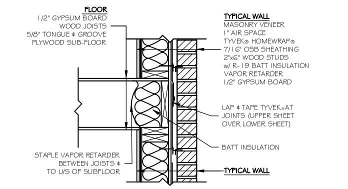
Exhibit A-Approved Plans





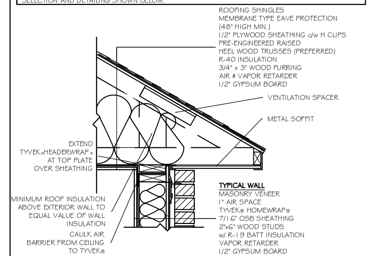

## TYPICAL WALL ISOMETRIC
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.

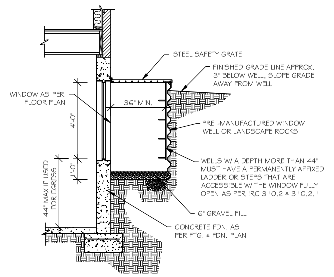



## FLOOR/ WALL INTERFACE DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.

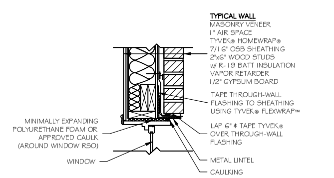



## ROOF/ WALL INTERFACE DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)



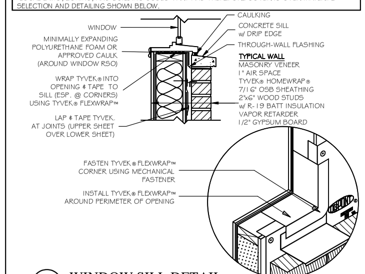

## WINDOW WELL DETAIL
SCALE: N.T.S.

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.



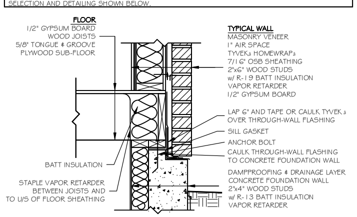

## WINDOW HEAD DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.



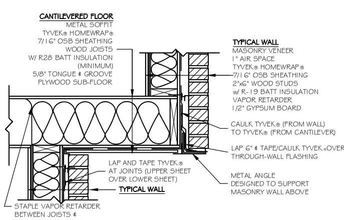

## WINDOW SILL DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
*FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS. (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.




## BASE OF WALL DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
*SEAL OR GASKET BRICK TIES AT THE FACE OF TYVEK ®
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.




## CANTILEVERED FLOOR DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)

GENERAL NOTES
*SEAL ALL TYVEK® JOINTS AND PENETRATIONS WITH APPROVED TAPE. (ex. DUPONT CONTRACTOR TAPE)
***FASTEN TYVEK® TO SHEATHING WITH LARGE HEAD NAILS OR USE NAILS WITH LARGE PLASTIC WASHER HEADS.** (ex. DUPONT WRAPCAPS)
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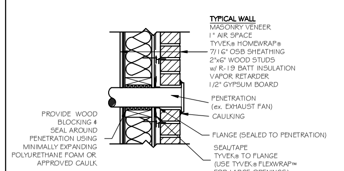
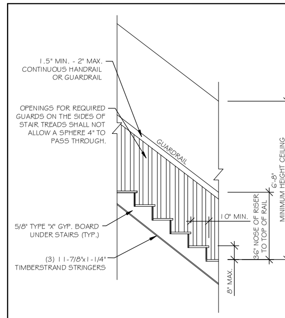
*LOCAL LAWS, ZONING, AND BUILDING CODES VARY AND THEREFORE GOVERNS OVER MATERIAL SELECTION AND DETAILING SHOWN BELOW.




## WALL PENETRATION DETAIL
RESIDENTIAL WOOD FRAME STRUCTURE w/ MASONRY VENEER (HEATING CLIMATE)




## TYPICAL STAIR DETAIL
SCALE: N.T.S.

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VOICE: 801-476-1860
FAX: 801-476-1828


HABITATIONS
RESIDENTIAL DESIGN GROUP



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SHEET TITLE:
HOUSE WRAP DETAILS

DRAWN BY: M. STEELE
CHK'D BY: T. RICKS
ISSUE DATE: XX/XX/2016
PLAN NUMBER: 4S4465
SHEET NUMBER: AD1 OF 15

**REPORT**
**GEOTECHNICAL STUDY**
**LOT 42R POWDER MOUNTAIN WEST SUBDIVISION**
**6706 ASPEN DRIVE**
**WEBER COUNTY, UTAH**

Submitted To:

Jim and Ally DePiano
97 West Ridge Road
Stowe, Vermont

Submitted By:

GSH Geotechnical, Inc.
1596 West 2650 South
Ogden, Utah 84401

September 22, 2016

Job No. 2223-01N-16

September 22, 2016
Job No. 2223-01N-16

Jim and Ally DiPiano
97 West Ridge Road
Stowe, Vermont 05672

Re: Report
Geotechnical Study
Lot 42R Powder Mountain West Subdivision
6706 Aspen Drive
Weber County, Utah
(41.3803° N; 111.7862° W)

# 1. INTRODUCTION

## 1.1 GENERAL

This report presents the results of our geotechnical study performed for Lot 42R of the Powder Mountain West Subdivision located at 6706 Aspen Drive in Weber County, Utah. The general location of the site with respect to major roadways, as of 2014, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing the existing improvements is presented on Figure 2, Site Plan. The locations of the test pits excavated in conjunction with this study are also presented on Figure 2.

## 1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. Joe Sadler of Habitations Residential Design Group and Mr. Andrew Harris of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, and slope stability recommendations as well as geoseismic information to be utilized in the design and construction of the proposed home.

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In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the excavating and sampling of 3 test pits.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analyses, and the preparation of this summary report.

### 1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of our Professional Services Agreement No. 16-0637Nrev1 dated July 18, 2016.

### 1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration test pits, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction, of this report. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

## 2. PROPOSED CONSTRUCTION

The proposed project consists of constructing a single-family residence on Lot 42R of the Powder Mountain West Subdivision in Weber County, Utah. Construction will likely consist of reinforced concrete footings and basement foundation walls supporting 2 to 3 wood-framed levels above grade. Projected maximum column and wall loads are on the order of 10 to 25 kips and 1 to 3 kips per lineal foot, respectively.

Site development will require a moderate amount of earthwork in the form of site grading. We estimate in general that maximum cuts and fills to achieve design grades will be on the order of 2 to 8 feet. Larger cuts and fills may be required in isolated areas. To facilitate grading at the site, the upslope walls of the structures must be designed as retaining walls. Additionally, a series of rockery landscape walls are planned around the proposed structure to facilitate grading.

# 3. INVESTIGATIONS

## 3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions at the site, 3 test pits were excavated to depths of about 5.5 to 6.0 feet below existing grade. The test pits were excavated using a rubber tire-mounted excavator. Test pit locations are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the excavating operations, a continuous log of the subsurface soil conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained and placed in sealed bags and plastic containers for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications have been supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3C, Test Pit Log. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Test Pit Log (USCS).

A 2.42-inch inside diameter thin-wall drive sampler was utilized in the subsurface sampling of the test pits at the site.

Following completion of excavation operations, each test pit was backfilled. Although an effort was made to compact the backfill with the backhoe, backfill was not placed in uniform lifts and compacted to a specific density. Consequently, the backfill soils must be considered as non-engineered and settlement of the backfill with time is likely to occur.

## 3.2 LABORATORY TESTING

### 3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was performed. The program included moisture, density, partial gradations, Atterberg limits, and direct shear tests. The following paragraphs describe the tests and summarize the test data.

### 3.2.2 Moisture and Density

To provide index parameters and to correlate other test data, moisture and density tests were performed on selected samples. The results of these tests are presented on the test pit logs, Figures 3A through 3C.

### 3.2.3 Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below:

| Test Pit No. | Depth (feet) | Percent Passing No. 200 Sieve | Soil Classification |
|---|---|---|---|
| TP-1 | 1.0 | 16.7 | SC |
| TP-1 | 4.0 | 28.3 | SC |
| TP-2 | 3.0 | 15.3 | SC |
| TP-2 | 4.0 | 32.7 | SC |
| TP-3 | 3.0 | 17.4 | SC |

### 3.2.4 Atterberg Limit Tests

To aid in classifying the soils, Atterberg limit tests were performed on samples of the fine-grained cohesive soils. Results of the test are tabulated below:

| Test Pit No. | Depth (feet) | Liquid Limit (percent) | Plastic Limit (percent) | Plasticity Index (percent) | Soil Classification |
|---|---|---|---|---|---|
| TP-2 | 3.0 | 42 | 22 | 20 | CL |

### 3.2.5 Laboratory Direct Shear Test

To determine the shear strength of the soils encountered at the site, a laboratory direct shear test was performed on a sample of the site soils. The results of the test are tabulated below:

| Test Pit No. | Depth (feet) | Soil Type | In-Situ Moisture Content (percent) | Dry Density (pcf) | Internal Friction Angle (degrees) | Apparent Cohesion (psf) |
|---|---|---|---|---|---|---|
| TP-2 | 4.0 | SC | 12 | 101 | 37 | 60 |
| TP-3 | 3.0 | SC | 16 | 124 | 37 | 120 |

## 4. SITE CONDITIONS

### 4.1 GEOLOGIC SETTING

A geologic hazards reconnaissance study[1] dated July 21, 2016 was prepared for the subject property by Western Geologic, LLC, and a copy of that report is included in the attached Appendix.

### 4.2 SURFACE

The subject property is a vacant, generally rectangular shaped lot located at 6706 Aspen Drive in Weber County, Utah. The topography of the site slopes downward to the south at grades of about 10H:1V (Horizontal:Vertical) to about 2.5H:1V (Horizontal:Vertical) with an overall change in elevation of about 25 feet across the site. Vegetation at the site consists primarily of native weeds, grasses, brush, and numerous mature trees. The site is bordered on the north by similar undeveloped residential lots, on the east by residential property, on the south by Aspen Drive followed by undeveloped property, and on the west by undeveloped property.

### 4.3 SUBSURFACE SOIL

Subsurface conditions encountered at the test pit locations varied slightly across the site. Topsoil and disturbed soils were observed in the upper 1.0 foot at test pit locations. Natural soils were observed beneath the topsoil/disturbed soils to the full depth penetrated, about 5.5 to 6.0 feet below surrounding grades and consisted of fine to coarse sand with varying silt/clay and fine and coarse gravel content overlying quartzite bedrock.

The natural granular soils encountered were medium dense to dense, slightly moist to moist, light brown to brown in color, and will generally exhibit moderately high strength and low compressibility characteristics under the anticipated vertical loading.

For a more detailed description of the subsurface soils encountered, please refer to Figures 3A through 3C, Test Pit Log. The lines designating the interface between soil types on the test pit logs generally represent approximate boundaries. In-situ, the transition between soil types may be gradual.

### 4.4 GROUNDWATER

At the time of the test pit excavations and sampling operations, groundwater was not encountered in any of the test pits. Seasonal "perched" groundwater conditions may develop on top of the shallow bedrock encountered at the site. Seasonal and longer-term groundwater fluctuations of 1.0 to 2.0 feet should be anticipated. The highest seasonal levels will generally occur during the late spring and summer months.

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[1] "Report, Geologic Hazards Evaluation, Powder Mountain West Lot 42-R, 6706 Aspen Drive, Liberty, Weber County, Utah," Western Geologic, LLC, July 21, 2016.

## 5. DISCUSSIONS AND RECOMMENDATIONS

### 5.1 SUMMARY OF FINDINGS

The results of our analyses indicate that the proposed structure may be supported upon conventional spread and/or continuous wall foundations established upon a minimum of 2 feet of granular structural fill extending to suitable natural soils.

The most significant geotechnical aspects of the site are:

1. The surficial non-engineered fills resulting from the test pits associated with the geotechnical/geological study;
2. Potential seasonal perched groundwater above the shallow bedrock;
3. Maintaining stability of the slope at the property.

All non-engineered fill materials must be removed in their entirety from beneath all structures and flatwork and replaced with properly placed and compacted structural fill.

A subdrain system must be installed upslope of the home and rockery landscape walls to reduce the potential for surface water infiltration, as discussed further within this report. A foundation subdrain must be constructed for all exterior foundations.

Maintaining stability of the slopes at the site is critical to construction at the site. The upslope walls of all structures must be designed as retaining walls. Additionally, a series of rockery landscape walls are planned around the structures. Though these rockery walls are planned a landscape walls less than 4 feet in height, consideration must be given to proper construction of the rockery walls.

The on-site fine-grained soils may be re-utilized as structural site grading fill if they meet the requirements for such, as stated herein. However, it should be noted that from a handling and compaction standpoint, soils containing high amounts of fines (silts and clays) are very sensitive to changes in moisture content and will require very close moisture control during placement and compaction. <u>This will be very difficult, if not impossible, during wet and cold periods of the year.</u>

A geotechnical engineer from GSH will need to verify that all fill material (if encountered) and topsoil/disturbed soils have been completely removed and suitable natural soils encountered prior to the placement of structural site grading fills, floor slabs, foundations, or rigid pavements.

In the following sections, detailed discussions pertaining to earthwork, foundations, lateral pressure and resistance, floor slabs, slope stability, and the geoseismic setting of the site are provided.

## 5.2 EARTHWORK

### 5.2.1 Site Preparation

Initial site preparation will consist of the removal of surface vegetation, topsoil, and other deleterious materials from beneath an area extending out at least 3 feet from the perimeter of the proposed building, pavements, and exterior flatwork areas.

Additional site preparation will consist of the removal of existing non-engineered fills (if encountered) from an area extending out at least 3 feet from the perimeter of residential structures and 1 foot beyond rigid pavements.

Non-engineered fills/disturbed soil may remain in asphalt pavement and sidewalk areas as long as they are free of deleterious materials and properly prepared. Below rigid pavements non-engineered fills/disturbed soils must be removed. Additionally, the surface of any existing engineered fills must be prepared prior to placing additional site grading fills.

Proper preparation shall consist of scarifying, moisture conditioning, and re-compacting the upper 12 inches to the requirements for structural fill. As an option to proper preparation and recompaction, the upper 12 inches of non-engineered fill (where encountered) may be removed and replaced with granular subbase over unfrozen proofrolled subgrade. Even with proper preparation, pavements established overlying non-engineered fills may encounter some long-term movements unless the non-engineered fills are completely removed.

It must be noted that from a handling and compaction standpoint, onsite soils containing high amounts of fines (silts and clays) are inherently more difficult to rework and are very sensitive to changes in moisture content requiring very close moisture control during placement and compaction. <u>This will be very difficult, if not impossible, during wet and cold periods of the year.</u>

Subsequent to stripping and prior to the placement of structural site grading fill, pavements, driveway, and parking slabs on grade, the prepared subgrade must be proofrolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or loose soils are encountered, they must be removed to a maximum depth of 2 feet and replaced with structural fill. Beneath footings, all loose and disturbed soils must be totally removed. Fill soils must be handled as described above.

Surface vegetation, debris, and other deleterious materials shall generally be removed from the site. Topsoil, although unsuitable for utilization as structural fill, may be stockpiled for subsequent landscaping purposes.

A representative of GSH must verify that suitable natural soils and/or proper preparation of existing fills have been encountered/met prior to placing site grading fills, footings, slabs, and pavements.

### 5.2.2 Excavations

For granular (cohesionless) soils, construction excavations above the water table, not exceeding 4 feet, shall be no steeper than one-half horizontal to one vertical (0.5H:1V). For excavations up to 10 feet, in granular soils and above the water table, the slopes shall be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult and will require very flat sideslopes and/or shoring, bracing and dewatering. Excavations deeper than 10 feet are not anticipated at the site.

Temporary excavations up to 10 feet deep in fine-grained cohesive soils (if encountered), above or below the water table, may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1V).

To reduce disturbance of the natural soils during excavation, it is recommended that smooth edge buckets/blades be utilized.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

### 5.2.3 Structural Fill

Structural fill will be required as site grading fill, as backfill over foundations and utilities, and possibly as replacement fill beneath some footings. All structural fill must be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials.

Structural site grading fill is defined as fill placed over fairly large open areas to raise the overall site grade. The maximum particle size within structural site grading fill should generally not exceed 4 inches; although, occasional particles up to 6 to 8 inches may be incorporated provided that they do not result in "honeycombing" or preclude the obtainment of the desired degree of compaction. In confined areas, the maximum particle size should generally be restricted to 2.5 inches.

Only granular soils are recommended in confined areas such as utility trenches, below footings, etc. Generally, we recommend that all imported granular structural fill consist of a well-graded mixture of sands and gravels with no more than 20 percent fines (material passing the No. 200 sieve) and less than 30 percent retained on the 3/4 inch sieve. The plasticity index of import fine-grained soil shall not exceed 18 percent.

To stabilize soft subgrade conditions or where structural fill is required to be placed closer than 1.0 foot above the water table at the time of construction, a mixture of coarse gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) should be utilized. It may also help to utilize a stabilization fabric, such as Mirafi 600X or equivalent, placed on the native ground if 1.5- to 2.0-inch gravel is used as stabilizing fill.

On-site soils are not recommended as structural fill but may be used as non-structural grading fill in landscape areas. Non-structural site grading fill is defined as all fill material not designated as structural fill and may consist of any cohesive or granular soils not containing excessive amounts of degradable material.

### 5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the ASTM[2] D-1557 (AASHTO[3] T-180) compaction criteria in accordance with the table below:

| Location | Total Fill Thickness (feet) | Minimum Percentage of Maximum Dry Density |
|---|---|---|
| Beneath an area extending at least 5 feet beyond the perimeter of the structure | 0 to 10 | 95 |
| Site Grading Fills outside area defined above | 0 to 5 | 90 |
| Site Grading Fills outside area defined above | 5 to 10 | 95 |
| Trench Backfill | -- | 96 |
| Pavement granular base/subbase | -- | 96 |

Structural fills greater than 10 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation shall consist of the removal of all loose or disturbed soils.

If utilized for stabilizing fill, coarse gravel and cobble mixtures should be end-dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the "fines" are "worked into" the voids in the underlying coarser gravels and cobbles.

2 American Society for Testing and Materials
3 American Association of State Highway and Transportation Officials

### 5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling may be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proofrolling, they must be removed (to a maximum depth of 2 feet below design finish grade) and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1-a/A-1-b (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

Natural or imported silt/clay soils are not recommended for use as trench backfill, particularly in structurally loaded areas.

## 5.3 SLOPE STABILITY

### 5.3.1 Parameters

The properties of the soils at this site were estimated using the results of our laboratory testing, published correlations, and our experience with similar soils. Accordingly, we estimated the following parameters for use in the stability analyses:

| Material | Internal Friction Angle (degrees) | Apparent Cohesion (psf) | Saturated Unit Weight (pcf) |
|---|---|---|---|
| Natural Clayey Sand | 36 | 50 | 120 |
| Bedrock | 37 | 500 | 135 |
| Concrete | 0 | 28,800 | 150 |

For the seismic analysis, a peak horizontal ground acceleration of 0.264 using IBC 2012 guidelines and adjusted for Site Class effects (for Site Class D soils) was obtained for site (grid) locations of 41.3803 degrees latitude (north) and 111.7832 degrees longitude (west). To model sustained accelerations at the site, one-half of this value is typically used. Accordingly, a value of 0.132 was used as the pseudostatic coefficient in the seismic analyses.

### 5.3.2 Stability Analyses

We evaluated the global stability of the existing slope using the computer program *SLIDE*. This program uses a limit equilibrium (Simplified Bishop) method for calculating factors of safety against sliding on an assumed failure surface and evaluates numerous potential failure surfaces, with the most critical failure surface identified as the one yielding the lowest factor of safety of those evaluated. We analyzed the following configuration based on the cross-section provided in the referenced geologic study and proposed grading plan provided by Habitations Residential Design Group (see geological study in appendix for cross-section information and location):

- An approximately 10 foot high slopes graded at about 3H:1V (Horizontal:Vertical) followed by 3 building pads for the home followed by a 25-foot high slope graded at about 2.5H:1V (Horizontal:Vertical). The overall change in elevation is about 67 feet across the site. To simulate the load imposed on the slope by the proposed home, a load of 1,500 psf was modeled over the proposed building area. In addition, a phreatic surface was included in our analyses to account for potential perched groundwater.

Typically, the required minimum factors of safety are 1.5 for static conditions and 1.0 for seismic (pseudostatic) conditions. The results of our analyses indicate that the proposed slope configurations and rockery walls analyzed will meet both these requirements provided our recommendations are followed (see Figures 5 and 6).

Slope movements or even failure can occur if the slope soils are undermined or become saturated. Groundwater was not encountered during the course of our field investigation however seasonal perched groundwater conditions may develop above the shallow bedrock encountered at the site. Saturation of the slope soils can adversely affect the stability of the slope. Measures must be implemented to reduce the potential for saturation of the soils at the site. Surface drainage at the bottom and top of the slope should be directed to prevent ponding at the toe or crest of the slope. Subdrains must be constructed behind the rockery walls as discussed below. Additionally, a cut-off drain on the slope above the home is recommended to reduce the potential for infiltration of surface water at the site, as discussed further in Section 5.8, Subdrains. Landscape irrigation on this and surrounding areas may also create additional seasonal groundwater fluctuations. The limitations of landscape irrigation at the site are discussed further in Section 5.9, Site Irrigation. The property owner and the owner's representatives should be made aware of the risks should these or other conditions occur that could saturate or erode/undermine the slope soils.

Changes to the grading at the site and any retaining walls must be properly engineered to maintain stability of the slopes. The upslope walls of structures at this site must be properly engineered to act as retaining walls and must be a minimum of 12 inches thick. The footing must be appropriately sized by the structural engineer to act as a cantilevered concrete retaining wall. GSH must review the final grading plans for the project prior to initiation of any construction.

### 5.3.3 Rockery Wall Recommendations

Rockery landscape walls are planned for the site. The rockery walls are intended to be constructed as landscape features. Recommendations for the construction of rockery landscape walls are provided below:

- Rockery walls may be constructed to a maximum exposed height of 4 feet per tier. If constructed in tiers, each tier separated by a minimum of 6 feet from wall face to wall face. The rockery wall tiers must be composed of boulders with a minimum nominal size (diameter) of 36 inches for the lowest row of boulders, grading in size to 24 inches for the top row of boulders, with the lowest row of boulders embedded a minimum of 1 foot below the ground surface.

- The rockery wall facing should slope at 1.0H:2.0V or flatter.

- Boulders used in the rock walls should be durable (i.e. not limestone, soft sandstone, conglomerate, or other rocks which have weakened planes that could cause rocks to split) and placed in a manner that will not significantly weaken their internal integrity. There should be maximum rock-to-rock contact when placing the rock boulders and no rocks should bear on a downward-sloping face of any supporting rocks. Larger gaps may be filled with smaller rocks or sealed with a cement grout.

- Drainage behind the walls must be provided. The drain shall consist of a perforated 4-inch minimum diameter pipe wrapped in fabric and placed at the bottom and behind the lowest row of boulders. The pipe shall daylight at one or both ends of the wall and discharge to an appropriate drainage device or area. Clean gravel up to 2 inches in maximum size, with less than 10 percent passing the No. 4 sieve and less than 5 percent passing the No. 200 sieve, shall be placed around the drain pipe. A fabric, such as Mirafi 140N or equivalent, shall be placed between the clean gravel and the adjacent soils. A zone of clean gravel and fabric at least 12 inches wide shall also extend above the drain, upward and behind the boulders to about 2 feet below the top of the wall.

- Structural site grading fill must be placed per the recommendations discussed with this study.

It should be noted that rockery walls are constructed of natural materials and are therefore subject to natural weathering processes and environmental attacks that may compromise the stability of the rockery wall. Boulders used during construction are subject to natural weathering by seasonal changes, wind, frost action, chemical reaction, water, etc. Additionally, the stability of rockery walls can be affected by other onsite and offsite influences such as saturation of retained soils, saturation of supporting soils, root action of vegetation and trees adjacent to the wall, and animal activities including burrowing and nesting. Rockery walls and the associated slopes must be closely monitored for signs of excessive weathering, drainage characteristics, signs of movement in the boulder, obstruction of drain outlets, etc. Frequent maintenance, repair, and inspection must be performed on the wall at least weekly and more often if any signs of erosion or movement are noticed. If any signs of erosion or movement are noticed, GSH must be contacted immediately to provide recommendations.

## 5.4 SPREAD AND CONTINUOUS WALL FOUNDATIONS

### 5.4.1 Design Data

The proposed structure may be supported upon conventional spread and continuous wall foundations established upon a minimum of 1.5 feet of structural fill extending to suitable natural soils. For design, the following parameters are provided:

| | |
|---|---|
| Minimum Recommended Depth of Embedment for Frost Protection | - 30 inches |
| Minimum Recommended Depth of Embedment for Non-frost Conditions | - 15 inches |
| Recommended Minimum Width for Continuous Wall Footings | - 16 inches |
| Minimum Recommended Width for Isolated Spread Footings | - 24 inches |
| Recommended Net Bearing Pressure for Real Load Conditions | - 1,500 pounds per square foot |
| Bearing Pressure Increase for Seismic Loading | - 50 percent |

The term "net bearing pressure" refers to the pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

### 5.4.2 Installation

Shallow bedrock was encountered at the site. Excavation extending into the bedrock may require the use of heavy equipment, chipping, or light blasting.

Footings shall not be installed directly upon bedrock, soft or disturbed soils, non-engineered fill, construction debris, frozen soil, or within ponded water. If the granular structural fill upon which the footings are to be established becomes disturbed, it shall be recompacted to the requirements for structural fill or be removed and replaced with structural fill.

The width of structural fill, where placed below footings, shall extend laterally at least 6 inches beyond the edges of the footings in all directions for each foot of fill thickness beneath the footings. For example, if the width of the footing is 2 feet and the thickness of the structural fill beneath the footing is 1.5 feet, the width of the structural fill at the base of the footing excavation would be a total of 3.5 feet, centered below the footing.

### 5.4.3 Settlements

Maximum settlements of foundations designed and installed in accordance with recommendations presented herein and supporting maximum anticipated loads as discussed in Section 2, Proposed Construction, are anticipated to be 1 inch or less.

Approximately 40 percent of the quoted settlement should occur during construction.

## 5.5 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the foundations and the supporting soils. In determining frictional resistance, a coefficient of 0.40 should be utilized for foundations placed over granular structural fill. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

## 5.6 LATERAL PRESSURES

The lateral pressure parameters, as presented within this section, are for backfills which will consist of drained granular soil placed and compacted in accordance with the recommendations presented herein. The lateral pressures imposed upon subgrade facilities will, therefore, be basically dependent upon the relative rigidity and movement of the backfilled structure. For active walls, such as retaining walls which can move outward (away from the backfill), granular backfill may be considered equivalent to a fluid with a density of 35 pounds per cubic foot in computing lateral pressures. For more rigid walls (moderately yielding), generally not exceeding 8 feet in height, granular backfill may be considered equivalent to a fluid with a density of 45 pounds per cubic foot. The above values assume that the surface of the soils slope behind the wall is no steeper than 4 horizontal to 1 vertical and that the granular fill within 3 feet of the wall will be compacted with hand-operated compacting equipment.

For seismic loading, a uniform pressure shall be added. The uniform pressures based on different wall heights are provided in the table on the following page.

| Wall Height (feet) | Seismic Loading Active Case (psf) | Seismic Loading Moderately Yielding (psf) |
|---|---|---|
| 4 | 25 | 55 |
| 6 | 40 | 85 |
| 8 | 55 | 115 |

## 5.7 FLOOR SLABS

Floor slabs may be established upon a minimum of 1.5 feet of structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established over non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. In order to provide a capillary break and facilitate curing of the concrete, it is recommended that floor slabs be directly underlain by 4 inches of "free-draining" fill, such as "pea" gravel or three-quarters- to one-inch minus clean gap-graded gravel.

Settlement of lightly loaded floor slabs (average uniform pressure of 100 to 150 pounds per square foot or less) is anticipated to be less than 1/4 inch.

## 5.8 SUBDRAINS

### 5.8.1 General

We recommend that the perimeter foundation subdrains and a cutoff drain above the home be installed as indicated below.

### 5.8.2 Foundation Subdrains

Foundation subdrains should consist of a 4-inch diameter perforated or slotted plastic or PVC pipe enclosed in clean gravel. The invert of a subdrain should be at least 2 feet below the top of the lowest adjacent floor slab. The gravel portion of the drain should extend 2 inches laterally and below the perforated pipe and at least 1 foot above the top of the lowest adjacent floor slab. The gravel zone must be installed immediately adjacent to the perimeter footings and the foundation walls. To reduce the possibility of plugging, the gravel must be wrapped with a geotextile, such as Mirafi 140N or equivalent. Above the subdrain, a minimum 4-inch-wide zone of "free-draining" sand/gravel should be placed adjacent to the foundation walls and extend to within 2 feet of final grade. The upper 2 feet of soils should consist of a compacted clayey cap to reduce surface water infiltration into the drain. As an alternative to the zone of permeable sand/gravel, a prefabricated "drainage board," such as Miradrain or equivalent, may be placed adjacent to the exterior below-grade walls. Prior to the installation of the footing subdrain, the below-grade walls should be dampproofed. The slope of the subdrain should be at least 0.3 percent. The gravel placed around the drain pipe should be clean 0.75-inch to 1.0-inch minus gap-graded gravel and/or "pea" gravel. The foundation subdrains can be discharged into the area subdrains, storm drains, or other suitable down-gradient location.

We recommend final site grading slope away from the structures at a minimum 2 percent for hard surfaces (pavement) and 5 percent for soil surfaces within the first 10 feet from the structures.

#### 5.8.3 Cutoff Drain

To reduce potential infiltration of surface water and groundwater into the subsurface soils at the site, a cutoff drain should be installed upslope of the home. Final location of the required cutoff drains must be reviewed by GSH prior to construction. The drain should consist of a perforated 4-inch minimum diameter pipe wrapped in fabric and placed near the bottom of a minimum 24 inch wide trench excavated to a depth of at least 10 feet below existing grade or to competent bedrock and lined in filter fabric. The pipe should daylight at one or both ends of the drain and discharge to an appropriate drainage device or area. Clean gravel up to 2 inches in maximum size, with less than 10 percent passing the No. 4 sieve and less than 5 percent passing the No. 200 sieve, should be placed around the drain pipe. A fabric, such as Mirafi 140N or equivalent, should be placed between the clean gravel and the adjacent soils. A zone of clean gravel wrapped in fabric at least 24 inches wide should also extend above the drain, to within 2 feet of the ground surface, with fabric placed over the top of the gravel. The upper 2 feet of soils should consist of a compacted clayey cap to reduce surface water infiltration into the drain.

### 5.9 SITE IRRIGATION

Proper site drainage is important to maintaining slope stability at the site. Saturation of soils at the site may result in slope movement or failure. Therefore, we recommend that no irrigation lines should be placed on the slope. Landscaping at the site should be planned to utilize drought resistant plants that require minimal watering. Plants or lawn may be placed on the slope, with plants watered using direct drip systems targeted only for each plant, and any lawn areas watered using sprinklers placed in a manner such that watering is a minimum of 30 feet back from the crest of the slope. Overwatering should be strictly avoided. The surface of the site should be graded to prevent the accumulation or ponding of surface water at the site. The property owner and the owner's representatives should be made aware of the risks should these or other conditions occur that could saturate or erode/undermine the slope soils.

To reduce the potential for saturation of the site soils, overwatering at the site should be strictly avoided. Watering at the site should be limited to a maximum equivalent rainfall of 0.5 inches per week. Irrigation at the site should be strictly avoided during periods of natural precipitation.

## 5.10 GEOSEISMIC SETTING

### 5.10.1 General

Utah municipalities have adopted the International Building Code (IBC) 2015. The IBC 2015 code determines the seismic hazard for a site based upon 2008 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

The structure must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2015 edition.

### 5.10.2 Faulting

Based upon our review of available literature, no active faults are known to pass through the site. The nearest active fault is the Wasatch Fault Zone Weber Section, approximately 8.6 miles southwest of the site.

### 5.10.3 Soil Class

For dynamic structural analysis, the Site Class D – Stiff Soil Profile as defined in Chapter 20 of ASCE 7 (per Section 1613.3.2, Site Class Definitions, of IBC 2012) can be utilized.

### 5.10.4 Ground Motions

The IBC 2012 code is based on 2008 USGS mapping, which provides values of short and long period accelerations for the Site Class B boundary for the Maximum Considered Earthquake (MCE). This Site Class B boundary represents average bedrock values for the Western United States and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class D soil profile. Based on the site latitude and longitude (41.3803 degrees north and -111.7862 degrees west, respectively), the values for this site are tabulated below:

| Spectral Acceleration Value, T | Site Class B Boundary [mapped values] (% g) | Site Coefficient | Site Class D [adjusted for site class effects] (% g) | Design Values (% g) |
|---|---|---|---|---|
| Peak Ground Acceleration | 34.2 | $F_a$ = 1.158 | 39.6 | 26.4 |
| 0.2 Seconds (Short Period Acceleration) | $S_S$ = 85.6 | $F_a$ = 1.158 | $S_{MS}$ = 99.1 | $S_{DS}$ = 66.1 |
| 1.0 Second (Long Period Acceleration) | $S_1$ = 28.6 | $F_v$ = 1.828 | $S_{M1}$ = 52.3 | $S_{D1}$ = 34.9 |

### 5.10.5 Liquefaction

The site is located in an area that has been identified by the Utah Geologic Survey as having "very low" liquefaction potential. Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clay soils, even if saturated, will generally not liquefy.

Liquefaction of the site soils is not anticipated during the design seismic event due to the lack of groundwater observed at the site.

## 5.11 SITE OBSERVATIONS

As stated previously, prior to placement of foundations, floor slabs, pavements, and site grading fills, a geotechnical engineer from GSH must verify that all non-engineered fill materials, topsoil, and disturbed soils have been removed and/or properly prepared and suitable subgrade conditions encountered. Additionally, GSH must observe fill placement and verify in-place moisture content and density of fill materials placed at the site.

## 5.12 CLOSURE

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 393-2012.

Respectfully submitted,

**GSH Geotechnical, Inc.**

LICENSED PROFESSIONAL ENGINEER
ANDREW MICHAEL HARRIS
No. 7420456
STATE OF UTAH

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Reviewed by:

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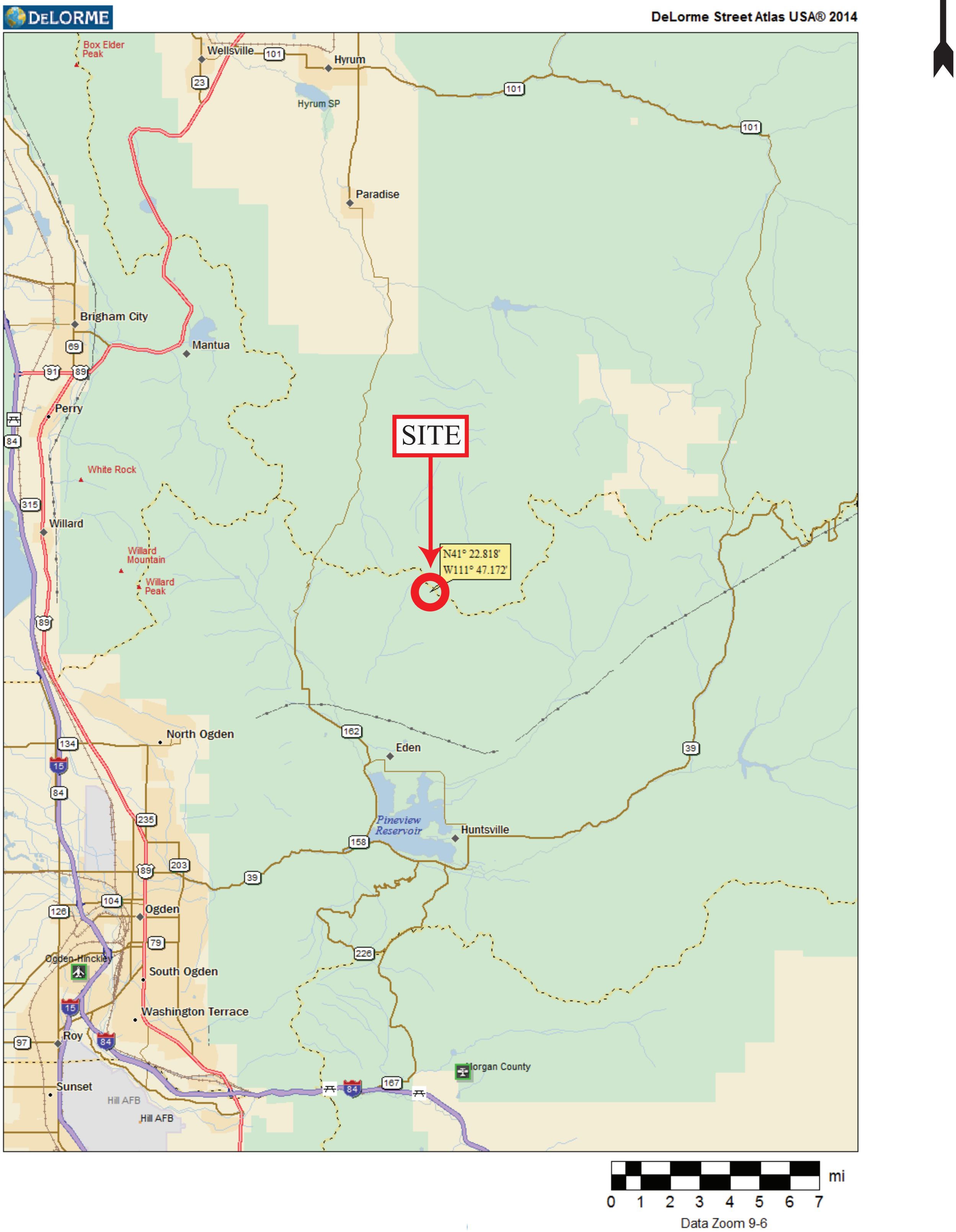
Senior Geotechnical Engineer

AMH/MSH:mmh

| | | | |
|---|---|---|---|
| Encl. | Figure | 1, | Vicinity Map |
| | Figure | 2, | Site Plan |
| | Figures | 3A | through 3C, Test Pit Logs |
| | Figure | 4, | Key to Test Pit Log (USCS) |
| | Figures | 5 | and 6, Stability Results |
| | Appendix, | | Geologic Hazards Reconnaissance Study |

Addressee (email)

JIM AND ALLY DEPIANO
JOB NO. 2223-01N-16



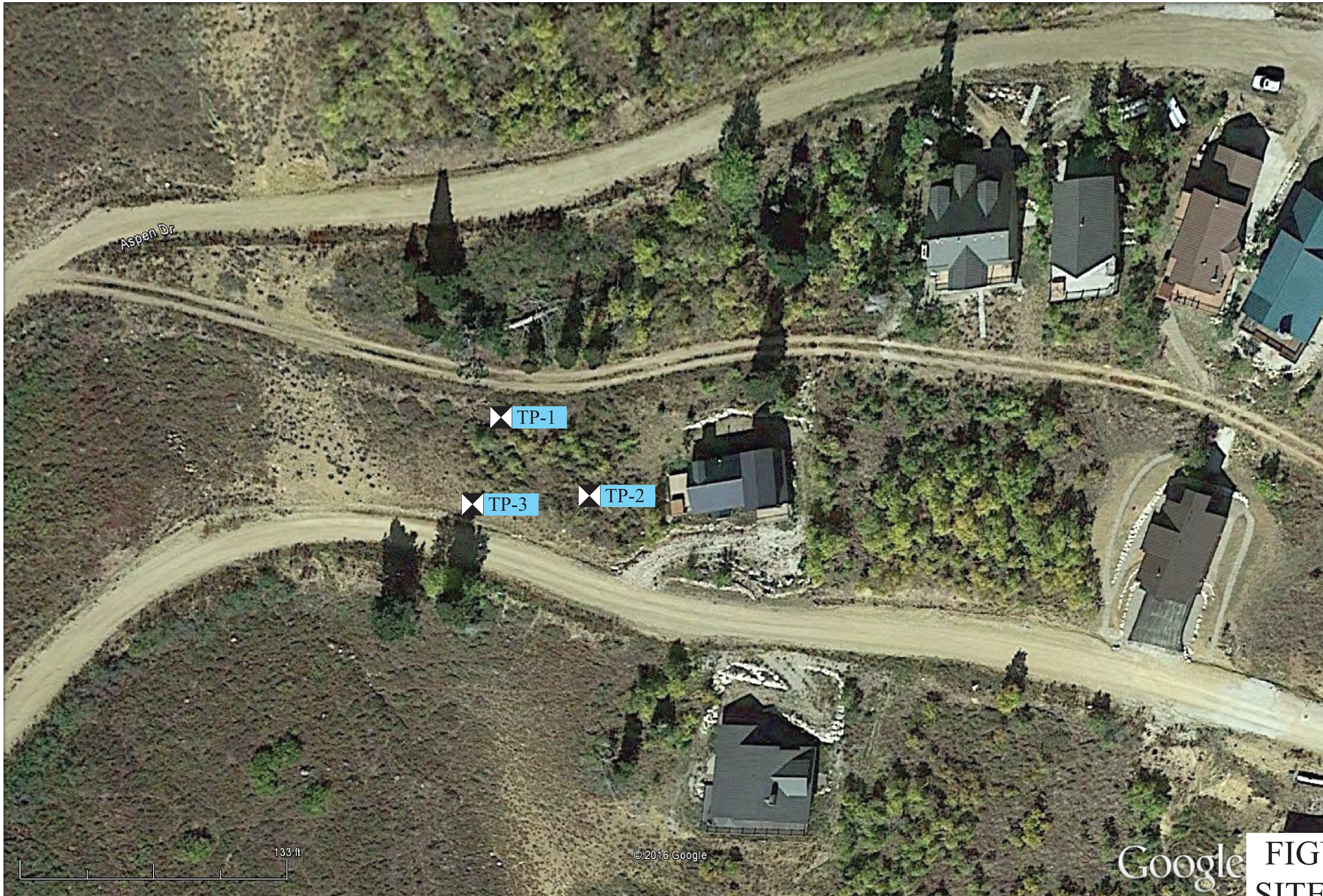

# FIGURE 1

# VICINITY MAP

GSH

REFERENCE:
DELORME STREET ATLAS

JIM AND ALLY DEPIANO
JOB NO. 2223-01N-16




REFERENCE:
ADAPTED FROM AERIAL PHOTOGRAPH
DOWNLOADED FROM GOOGLE EARTH
IMAGERY DATE: JUNE 16, 2015

FIGURE 2
SITE PLAN

GSH

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# TEST PIT LOG

Page: 1 of 1

## TEST PIT: TP-1

CLIENT: Jim and Ally DePiano | PROJECT NUMBER: 2223-01N-16

PROJECT: Lot 42R Powder Mountain West Subdivision | DATE STARTED: 7/1/16 | DATE FINISHED: 7/1/16

LOCATION: 6706 Aspen Drive, Weber County, Utah | GSH FIELD REP.: JM

EXCAVATING METHOD/EQUIPMENT: Backhoe

GROUNDWATER DEPTH: Not Encountered (7/1/16) | ELEVATION: ---

| WATER LEVEL | USCS | DESCRIPTION | DEPTH (FT.) | SAMPLE SYMBOL | MOISTURE (%) | DRY DENSITY (PCF) | % PASSING 200 | LIQUID LIMIT (%) | PLASTICITY INDEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Ground Surface** | 0 | | | | | | | |
| | SC | CLAYEY SAND<br>with some fine and coarse gravel; trace organics; brown | | ▮ | 7 | | 17 | | | slightly moist<br>medium dense |
| | SM | SILTY FINE TO COARSE SAND<br>with some fine and coarse gravel; light brown | | ◢ | 10 | | 28 | | | moist<br>medium dense |
| | | | 5 | | | | | | | |
| | | End of Exploration at 6.0' due to excavator refusal<br>No significant sidewall caving<br>No groundwater encountered at time of excavation | | | | | | | | |
| | | | 10 | | | | | | | |
| | | | 15 | | | | | | | |
| | | | 20 | | | | | | | |
| | | | 25 | | | | | | | |

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

# GSH — TEST PIT LOG

Page: 1 of 1

## TEST PIT: TP-2

CLIENT: Jim and Ally DePiano
PROJECT NUMBER: 2223-01N-16
PROJECT: Lot 42R Powder Mountain West Subdivision
DATE STARTED: 7/1/16
DATE FINISHED: 7/1/16
LOCATION: 6706 Aspen Drive, Weber County, Utah
GSH FIELD REP.: JM
EXCAVATING METHOD/EQUIPMENT: Backhoe
GROUNDWATER DEPTH: Not Encountered (7/1/16)
ELEVATION: ---

| WATER LEVEL | USCS | DESCRIPTION | DEPTH (FT.) | SAMPLE SYMBOL | MOISTURE (%) | DRY DENSITY (PCF) | % PASSING 200 | LIQUID LIMIT (%) | PLASTICITY INDEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Ground Surface** | | | | | | | | |
| | SC | CLAYEY SAND<br>with some fine and coarse gravel; trace organics; brown | 0 | | | | | | | slightly moist<br>medium dense |
| | | | | ■ | 7 | 90 | 15 | 42 | 12 | |
| | | | | ■ | 12 | 101 | 33 | | | |
| | | | 5 | | | | | | | |
| | | End of Exploration at 5.5' due to excavator refusal<br>No significant sidewall caving<br>No groundwater encountered at time of excavation | | | | | | | | |
| | | | 10 | | | | | | | |
| | | | 15 | | | | | | | |
| | | | 20 | | | | | | | |
| | | | 25 | | | | | | | |

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

# TEST PIT LOG

Page: 1 of 1

## TEST PIT: TP-3

CLIENT: Jim and Ally DePiano — PROJECT NUMBER: 2223-01N-16

PROJECT: Lot 42R Powder Mountain West Subdivision — DATE STARTED: 7/1/16 — DATE FINISHED: 7/1/16

LOCATION: 6706 Aspen Drive, Weber County, Utah — GSH FIELD REP.: JM

EXCAVATING METHOD/EQUIPMENT: Backhoe

GROUNDWATER DEPTH: Not Encountered (7/1/16) — ELEVATION: ---

| WATER LEVEL | USCS | DESCRIPTION | DEPTH (FT.) | SAMPLE SYMBOL | MOISTURE (%) | DRY DENSITY (PCF) | % PASSING 200 | LIQUID LIMIT (%) | PLASTICITY INDEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Ground Surface** | 0 | | | | | | | |
| | SC | CLAYEY SAND<br>with some fine and coarse gravel; trace organics; brown | | ◣ | | | | | | slightly moist<br>medium dense |
| | SM | SILTY FINE TO COARSE SAND<br>with some fine and coarse gravel; trace cobbles; trace organics; light brown | | ◣ | 9 | 124 | 17 | | | moist<br>dense |
| | | End of Exploration at 6.0' due to excavator refusal<br>No significant sidewall caving<br>No groundwater encountered at time of excavation | 5 | | | | | | | |
| | | | 10 | | | | | | | |
| | | | 15 | | | | | | | |
| | | | 20 | | | | | | | |
| | | | 25 | | | | | | | |

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

CLIENT: Jim and Ally DePiano
PROJECT: Lot 42R Powder Mountain West Subdivision
PROJECT NUMBER: 2223-01N-16

# KEY TO TEST PIT LOG

| WATER LEVEL | USCS | DESCRIPTION | DEPTH (FT.) | SAMPLE SYMBOL | MOISTURE (%) | DRY DENSITY (PCF) | % PASSING 200 | LIQUID LIMIT (%) | PLASTICITY INDEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ |

## COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑥ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑦ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑧ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑨ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑩ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑪ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

| CEMENTATION: | MODIFIERS: | | MOISTURE CONTENT (FIELD TEST): |
|---|---|---|---|
| **Weakly:** Crumbles or breaks with handling or slight finger pressure. | **Trace** | <5% | **Dry:** Absence of moisture, dusty, dry to the touch. |
| **Moderately:** Crumbles or breaks with considerable finger pressure. | **Some** | 5-12% | **Moist:** Damp but no visible water. |
| **Strongly:** Will not crumble or break with finger pressure. | **With** | > 12% | **Saturated:** Visible water, usually soil below water table. |

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

## UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

| MAJOR DIVISIONS | | | USCS SYMBOLS | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|
| **COARSE-GRAINED SOILS** More than 50% of material is larger than No. 200 sieve size. | **GRAVELS** More than 50% of coarse fraction retained on No. 4 sieve. | **CLEAN GRAVELS** (little or no fines) | GW | Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines |
| | | | GP | Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines |
| | | **GRAVELS WITH FINES** (appreciable amount of fines) | GM | Silty Gravels, Gravel-Sand-Silt Mixtures |
| | | | GC | Clayey Gravels, Gravel-Sand-Clay Mixtures |
| | **SANDS** More than 50% of coarse fraction passing through No. 4 sieve. | **CLEAN SANDS** (little or no fines) | SW | Well-Graded Sands, Gravelly Sands, Little or No Fines |
| | | | SP | Poorly-Graded Sands, Gravelly Sands, Little or No Fines |
| | | **SANDS WITH FINES** (appreciable amount of fines) | SM | Silty Sands, Sand-Silt Mixtures |
| | | | SC | Clayey Sands, Sand-Clay Mixtures |
| **FINE-GRAINED SOILS** More than 50% of material is smaller than No. 200 sieve size. | **SILTS AND CLAYS** Liquid Limit less than 50% | | ML | Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity |
| | | | CL | Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays |
| | | | OL | Organic Silts and Organic Silty Clays o f Low Plasticity |
| | **SILTS AND CLAYS** Liquid Limit greater than 50% | | MH | Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils |
| | | | CH | Inorganic Clays of High Plasticity, Fat Clays |
| | | | OH | Organic Silts and Organic Clays of Medium to High Plasticity |
| **HIGHLY ORGANIC SOILS** | | | PT | Peat, Humus, Swamp Soils with High Organic Contents |

Note: Dual Symbols are used to indicate borderline soil classifications.

**STRATIFICATION:**

| DESCRIPTION | THICKNESS |
|---|---|
| **Seam** | up to 1/8" |
| **Layer** | 1/8" to 12" |

**Occasional:** One or less per 6" of thickness
**Numerous;** More than one per 6" of thickness

**TYPICAL SAMPLER GRAPHIC SYMBOLS**

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD, 2.42" ID D&M Sampler
- 3.0" OD, 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

**WATER SYMBOL**

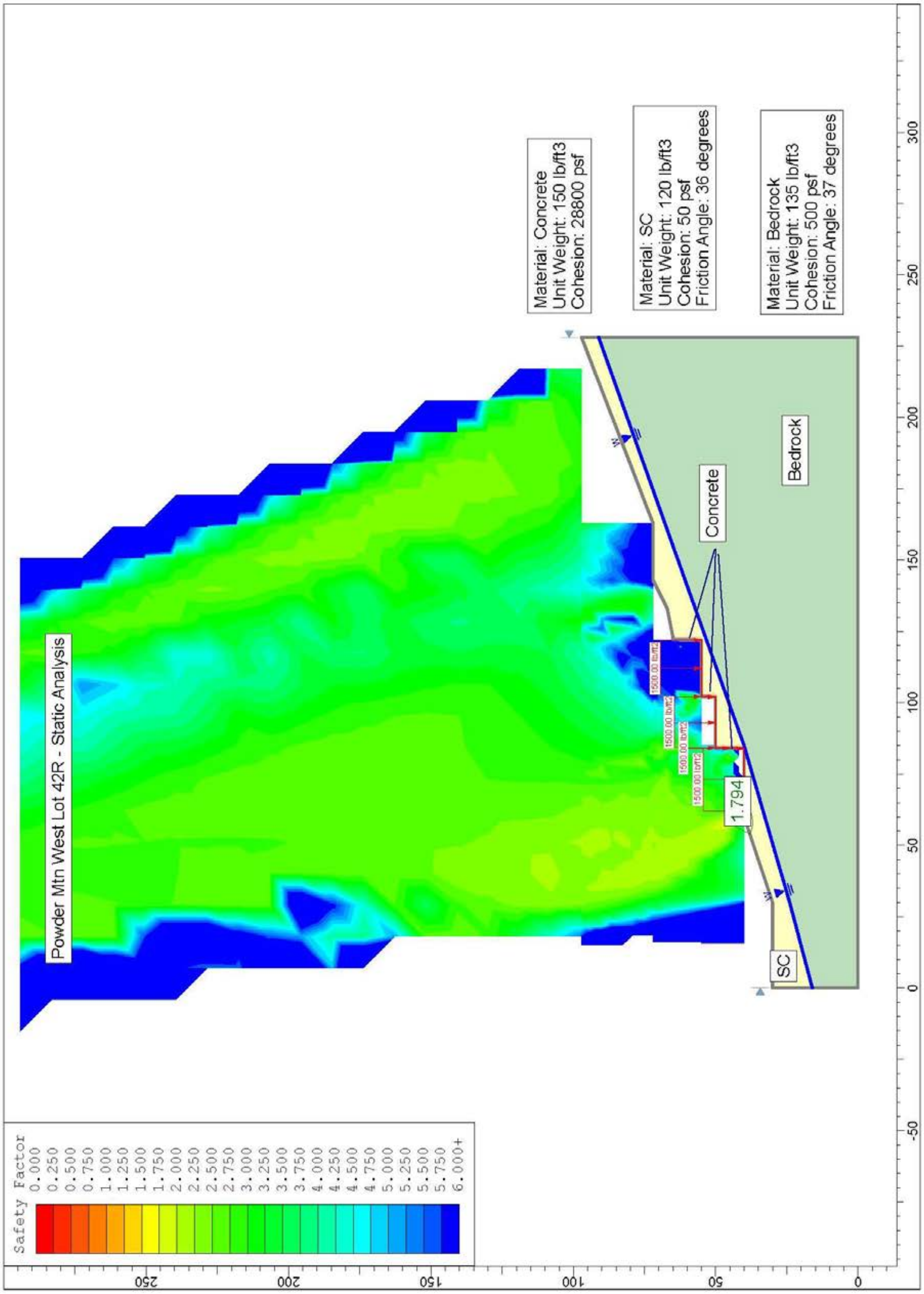
Water Level

**FIGURE 4**

GSH

# STABILITY RESULTS

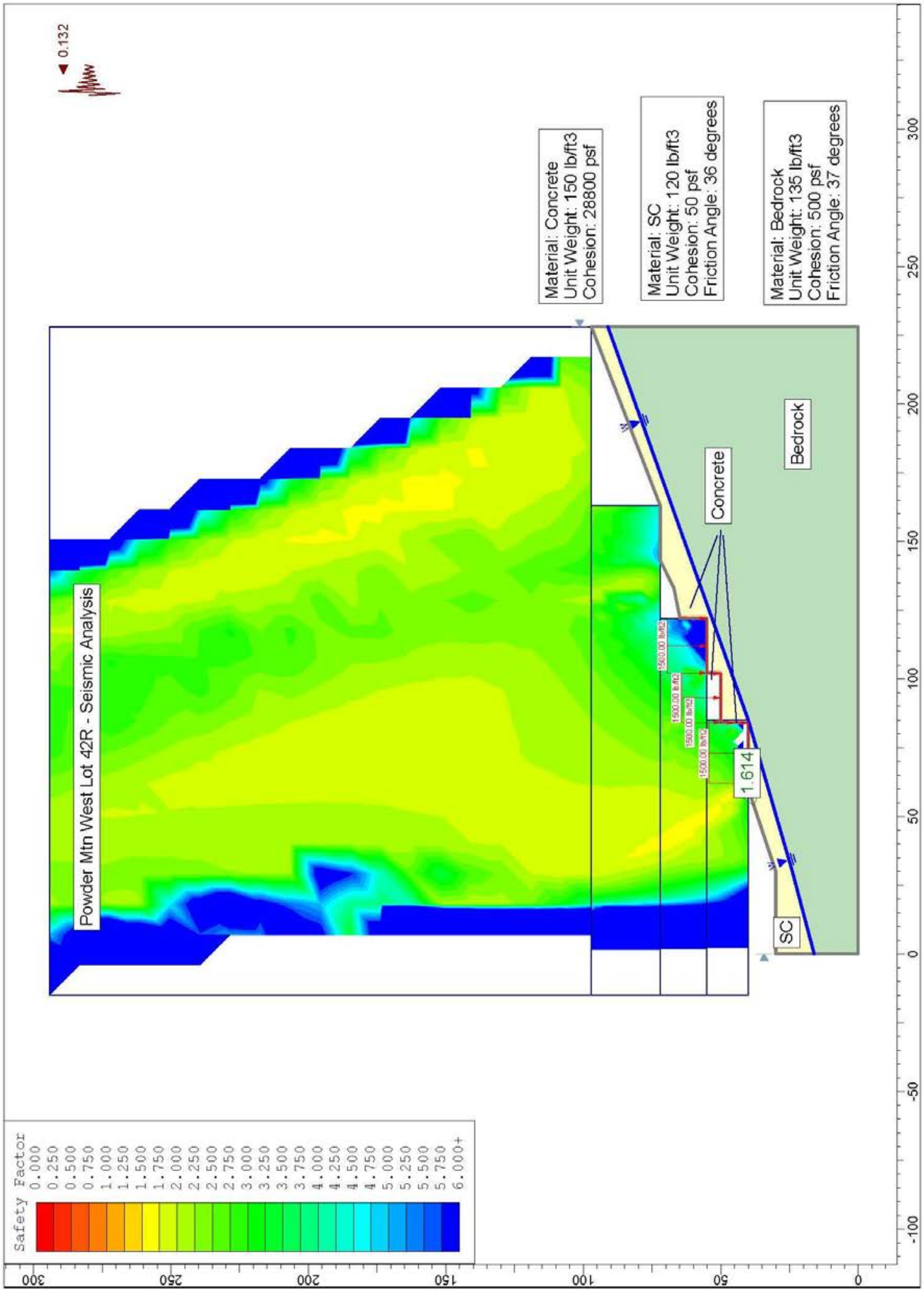
## LOT 42R POWDER MOUNTAIN WEST SUBDIVISION




| | | |
|---|---|---|
| **PROJECT NO.:** 2223-01N-16 | GSH | **FIGURE NO.:** 5 |

# STABILITY RESULTS

## LOT 42R POWDER MOUNTAIN WEST SUBDIVISION




| PROJECT NO.: 2223-01N-16 | GSH | FIGURE NO.: 6 |
|---|---|---|

# REPORT

# GEOLOGIC HAZARDS EVALUATION

## POWDER MOUNTAIN WEST LOT 42-R

## 6706 ASPEN DRIVE (6675 NORTH)

## EDEN, WEBER COUNTY, UTAH

***Prepared for***

GSH Geotechnical
1596 West 2650 South, Suite 107
Ogden, Utah 84401

July 21, 2016

***Prepared by***

Western GeoLogic, LLC
2150 South 1300 East, Suite 500
Salt Lake City, Utah 84106

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**WESTERN GEOLOGIC, LLC**
2150 SOUTH 1300 EAST, SUITE 500
SALT LAKE CITY, UT 84106 USA

Phone: 801.359.7222 Fax: 801.990.4601 Email: cnelson@westerngeologic.com

July 21, 2016

Andrew M. Harris, PE
Senior Geotechnical Engineer
GSH Geotechnical, Inc.
1596 West 2650 South, Suite 107
Ogden, Utah 84401

**SUBJECT:** Geologic Hazards Evaluation
Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

Dear Mr. Harris:

This report presents results of an engineering geology and geologic hazards review and evaluation conducted by Western GeoLogic, LLC (Western GeoLogic) for lot 42-R in the Powder Mountain West subdivision in Eden, Utah (Figure 1 – Project Location). The Project is identified as Weber County Assessor's parcel number 22-110-0011 (6706 East 6675 North). The site is on south- to southeast-facing slopes in the Wasatch Range at Powder Mountain Ski Area, and is in the SE1/4 Section 36, Township 8 North, Range 1 East (Salt Lake Base Line and Meridian; Figure 1). Elevation of the property ranges from about 8,264 feet to 8,308 feet above sea level. It is our understanding that the current intended site use is for development of a single-family residential home.

## PURPOSE AND SCOPE

The purpose and scope of this investigation is to identify and interpret geologic conditions at the site to identify potential risk from geologic hazards to the Project. This investigation is intended to: (1) provide geologic information and assessment of geologic conditions at the site; (2) identify potential geologic hazards that may be present and qualitatively assess their risk to the intended site use; and (3) provide recommendations for additional site- and hazard-specific studies or mitigation measures, as may be needed based on our findings. Such recommendations could require further multi-disciplinary evaluations, and/or may need design criteria that are beyond our professional scope.

The following services were performed in accordance with the above stated purpose and scope:

- A site reconnaissance conducted by an experienced certified engineering geologist to assess the site setting and look for adverse geologic conditions;

- Excavation and logging of three test pits at the site on July 1, 2016 to evaluate subsurface conditions at the property;
- Review of readily-available geologic maps, reports, and air photos; and
- Evaluation of available data and preparation of this report, which presents the results of our study.

The engineering geology section of this report has been prepared in accordance with current generally accepted professional engineering geologic principles and practice in Utah, and meets specifications provided in Chapter 27 of the Weber County Land Use Code.

## HYDROLOGY

The U.S. Geological Survey (USGS) topographic map of the James Peak Quadrangle shows the Project is slightly north of the head of South Fork Wolf Creek about 0.83 miles southeast of James Peak. South Fork Wolf Creek flows southward into Ogden Valley. Depth to groundwater at the site is unknown, but is likely greater than 50 feet. No springs are shown at the site or in the area on Figure 1 or were observed during our reconnaissance. Groundwater depth at the Project likely fluctuates seasonally from snowmelt, and also locally depending on bedrock flow patterns. Groundwater from snowmelt likely infiltrates through surficial colluvium, and then flows through bedrock fractures. Based on topography, we anticipate groundwater in the area to flow to the southeast into the South Fork Wolf Creek drainage basin and then into Ogden Valley further south.

Avery (1994) indicates groundwater in Ogden Valley occurs under perched, confined, and unconfined conditions in the valley fill to depths of 750 feet or more. A well-stratified lacustrine silt layer forms a leaky confining bed in the upper part of the valley-fill aquifer. The aquifer below the confining beds is the principal aquifer, which is in primarily fluvial and alluvial-fan deposits. The principal aquifer is recharged from precipitation, seepage from surface water, and subsurface inflow from bedrock into valley fill along the valley margins (Avery, 1994). The confined aquifer is typically overlain by a shallow, unconfined aquifer recharged from surface flow and upward leakage. Groundwater flow is generally from the valley margins into the valley fill, and then toward the head of Ogden Canyon (Avery, 1994). The site would be in a recharge area for the valley-fill aquifer.

## GEOLOGY

### Surficial Geology

The site is located in steep mountainous terrain in the Wasatch Range about 3.5 miles northeast of Ogden Valley near the divide between the Wellsville and Wolf Creek drainage basins. This divide marks the boundary between Weber and Cache Counties (to the south and north, respectively). The Wasatch Range is a major north-south trending mountain range that marks the eastern boundary of the Basin and Range physiographic province (Stokes; 1977, 1986); Ogden Valley is a sediment-filled intermontane valley within the Wasatch Range.

Surficial geology of the site is mapped by Coogan and King (2016; Figure 2) as Neoproterozoic (Precambrian-age) bedrock of the Mutual Formation. Coogan and King (2016) describe surficial geologic units in the site area on Figure 2 as follows:

> ***Qct*** - *Colluvium and talus, undivided (Holocene and Pleistocene)*. Unsorted clay- to boulder-sized angular debris (scree) at the base of and on steep, typically partly vegetated slopes; shown mostly on steep slopes of resistant bedrock units; 6 to 30 feet (2-9 m) thick.
>
> ***Qms, Qms?, Qmsy, Qmsy?, Qmso, Qmso?*** - *Landslide deposits (Holocene and upper and middle? Pleistocene).* Poorly sorted clay- to boulder sized material; includes slides, slumps, and locally flows and floods; generally characterized by hummocky topography, main and internal scarps, and chaotic bedding in displaced blocks; composition depends on local sources; morphology becomes more subdued with time and amount of water in material during emplacement; Qms may be in contact with Qms when landslides are different/distinct; thickness highly variable, up to about 20 to 30 feet (6-9 m) for small slides, and 80 to 100 feet (25-30 m) thick for larger landslides. Qmsy and Qmso queried where relative age uncertain; Qms queried where classification uncertain. Numerous landslides are too small to show at map scale and more detailed maps shown in the index to geologic mapping should be examined.
>
> Qms without a suffix is mapped where the age is uncertain (though likely Holocene and/or late Pleistocene), where portions of slide complexes have different ages but cannot be shown separately at map scale, or where boundaries between slides of different ages are not distinct. Estimated time of emplacement is indicated by relative-age letter suffixes with: Qmsy mapped where landslides deflect streams or failures are in Lake Bonneville deposits, and scarps are variably vegetated; Qmso typically mapped where deposits are "perched" above present drainages, rumpled morphology typical of mass movements has been diminished, and/or younger surficial deposits cover or cut Qmso. Lower perched Qmso deposits are at Qao heights above drainages (95 ka and older) and the higher perched deposits may correlate with high level alluvium (QTa_) (likely older than 780 ka) (see table 1). Suffixes y and o indicate probable Holocene and Pleistocene ages, respectively, with all Qmso likely emplaced before Lake Bonneville transgression. These older deposits are as unstable as other slides, and are easily reactivated with the addition of water, be it irrigation or septic tank drain fields.
>
> ***Qmc*** - *Landslide and colluvial deposits, undivided (Holocene and Pleistocene).* Poorly sorted to unsorted clay- to boulder-sized material; mapped where landslide deposits are difficult to distinguish from colluvium (slopewash and soil creep) and where mapping separate, small, intermingled areas of landslide and colluvial deposits is not possible at map scale; locally includes talus and debris flow and flood deposits; typically mapped where landslides are thin ("shallow"); also mapped where the blocky or rumpled morphology that is characteristic of landslides has been diminished ("smoothed") by slopewash and soil creep; composition depends on local sources; 6 to 40 feet (2-12 m) thick. These deposits are as unstable as other landslide units (Qms, Qmsy, Qmso).

Wasatch Formation (Eocene and upper Paleocene) – Typically red to brownish-red sandstone, siltstone, mudstone, and conglomerate with minor gray limestone and marlstone locally (see Twl); lighter shades of red, yellow, tan, and light gray present locally and more common in uppermost part, complicating mapping of contacts with overlying similarly colored Norwood and Fowkes Formations; clasts typically rounded Neoproterozoic and Paleozoic sedimentary rocks, mainly Neoproterozoic and Cambrian quartzite; basal conglomerate more gray and less likely to be red, and containing more locally derived angular clasts of limestone, dolomite and sandstone, typically from Paleozoic strata, for example in northern Causey Dam quadrangle; sinkholes indicate karstification of limestone beds; thicknesses on Willard thrust sheet likely up to about 400 to 600 feet (120-180 m) in Sharp Mountain, Dairy Ridge, and Horse Ridge quadrangles (Coogan, 2006a-b), about 1300 feet (400 m) in Monte Cristo Peak quadrangle, about 1100 feet (335 m) in northeast Browns Hole quadrangle, about 2200 feet (670 m) in southwest Causey Dam quadrangle, about 2600 feet (800 m) at Herd Mountain in Bybee Knoll quadrangle, and about 1300 feet (400 m) in northwest Lost Creek Dam quadrangle, estimated by elevation differences between pre-Wasatch rocks exposed in drainages and the crests of gently dipping Wasatch Formation on adjacent ridges (King); thickness varies locally due to considerable relief on basal erosional surface, for example along Right Fork South Fork Ogden River, and along leading edge of Willard thrust; much thicker, about 5000 to 6000 feet (1500-1800 m), south of Willard thrust sheet near Morgan. Wasatch Formation is queried (Tw?) where poor exposures may actually be surficial deposits. The Wasatch Formation is prone to slope failures. Other information on the Wasatch Formation is in Tw descriptions under the heading "Sub-Willard Thrust - Ogden Canyon Area" since Tw strata are extensive near Morgan Valley and cover the Willard thrust, Ogden Canyon, and Durst Mountain areas.

Along the South Fork Ogden River, Wasatch strata are mostly pebble, cobble, and boulder conglomerate with a matrix of smaller gravel, sand, and silt in the Browns Hole quadrangle, and coarse-grained sandstone to granule conglomerate as well as siltstone and mudstone to the east in the Causey Dam quadrangle; note thinning to east away from source area. The Wasatch weathers to boulder-covered dip (?) slopes north of the South Fork Ogden River, for example in Evergreen Park. Along the South Fork, the Wasatch Formation is separated from the underlying Hams Fork Member of the Evanston Formation by an angular unconformity of a few degrees, with the Hams Fork containing less siltstone and mudstone than the Wasatch and having a lighter color.

The Herd Mountain surface is developed on the Wasatch Formation at elevations of 7600 to 8600 feet (2300-2620 m) in the Bybee Knoll quadrangle and in remnants in the Huntsville, Browns Hole, and Sharp Mountain quadrangles. The origin of this boulder-strewn surface is debated (see Eardley, 1944; Hafen, 1961; Mullens, 1971). Eardley's (1944) Herd Mountain surface is flat lying or gently east dipping, about the same as the underlying Wasatch Formation, and is strewn with quartzite boulders to pebbles that King thinks are residual and colluvial deposits of uncertain age that were derived from the Wasatch Formation. The other characteristic of this surface is the presence of pimple mounds and, given the elevations of greater than about 7500 feet (2300 m), possible periglacial patterned ground. Photogrammetric dips on the Wasatch Formation under the surface are nearly flat (<3°) and an apparent angular unconformity is present in the Wasatch since dips on older Wasatch strata are greater than 3 degrees. King mapped this unconformity as a marker bed, but Coogan does not agree that this is an unconformity.

***Cbk, Cbk?*** - *Blacksmith Formation (Middle Cambrian)*. Typically, medium-gray, very thick to thick-bedded, dolomite and dolomitic limestone with tan-weathering, irregular silty partings to layers; weathers to lighter gray cliffs and ridges; 250 to 760 feet (75-230 m) thick in our map area. The Blacksmith Formation on the leading edge of the Willard thrust sheet thickens southward from 600 feet (180 m) along Sugar Pine Creek in the Dairy Ridge quadrangle, to about 760 feet (230 m) in the northwestern Horse Ridge quadrangle (Coogan, 2006a-b). To the south and west, the Blacksmith is about 500 feet (150 m) thick near Causey Dam (Mullens, 1969), with a 530-foot (161 m) thickness reported at the Baldy Ridge section (Rigo, 1968, aided by Mullens) in the Causey Dam or Horse Ridge quadrangle. Farther west, the Blacksmith is reportedly 409 feet (125 m) thick in the Sharp Mountain area (Hafen, 1961) and is about 250 feet (75 m) thick near the South Fork Wolf Creek in the Huntsville quadrangle (Coogan this report); still farther west, this unit is reportedly about 700 to 800 feet (210-245 m) thick near Mantua (Williams, 1948; Ezell, 1953; Sorensen and Crittenden, 1976a). So the thickness of the Blacksmith Formation is low in the Huntsville quadrangle and thickens to north, west, and east, and thickens southward on leading edge of thrust sheet.

The Blacksmith to the north of our map area is about 475 feet (144 m) thick in the Porcupine Reservoir quadrangle (Rigo, 1968; Hay, 1982), about 450 feet (137 m) thick near the Blacksmith Fork River (Maxey, 1958), and 410 feet (125 m) thick in Blacksmith Fork Canyon (Hay, 1982). The Blacksmith thickness in the Browns Hole area is uncertain due to poorly exposed Cambrian strata. Laraway's (1958) Blacksmith contacts are not those of Crittenden (1972) or our mapping (see also Hodges member above); so his reported 730-foot (220 m) thickness is suspect. Laraway's (1958) report of Bolaspidella and Ehmaniella trilobite fossils in his Blacksmith is also problematic because these fossils are characteristic of the Bloomington and Ute Formations, respectively (Maxey, 1958). Also, Laraway's description of covered intervals in typically cliff-forming Blacksmith imply a fault repetition of the Ute or his measuring at least 986 feet (300 m) of Ute (see Ute description for comparison) and less than 403 feet (123 m) of Blacksmith; further, Crittenden's (1972) large thicknesses (~1300 or less likely 1150 feet [~400 or <350 m]) and mixed carbonates above Ute shale on his lithologic column imply fault repetition(s). Our Blacksmith-Bloomington contact is above a non-resistant Ute interval that overlies a resistant cliffy interval in the Ute. This makes the Ute about 700 feet (215 m) thick on Crittenden's (1972) lithologic column, and the Blacksmith and lower Bloomington about 650 feet (200 m) thick on his column. Finally, Crittenden's (1972) lithologies are not like what Laraway (1958) reported in his measured section.

***Cu, Cu?*** - *Ute Formation (Middle Cambrian)*. Interbedded gray thin- to thick-bedded limestone with tan-, yellowish-tan-, and reddish-tan-weathering, wavy, silty layers and partings, and olive-gray to tan-gray, thin-bedded shale and micaceous argillite; and minor, medium-bedded, gray to light-gray dolomite; sand content in limestone increases upward such that calcareous sandstone is present near top of formation; mostly slope and thin ledge former; base less resistant (more argillaceous) than underlying Langston Formation; Zacanthoides, Kootenia, Bathyuriscus, and Peronopsis sp. trilobite fossils reported by Rigo (1968, USGS No. 5960-CO) in Causey Dam quadrangle; estimate 450 to 1000 feet (140-300 m) thick and thinnest on leading edge of Willard thrust sheet.

The thickness range for the Ute Formation is based on multiple studies. It is reportedly 600 to 700 feet (180-210 m) thick west of Sharp Mountain (see Ezell, 1953; Crittenden, 1972; Deputy, 1984), and though a 840-foot (256 m) thickness was reported north of our map area in the Porcupine Reservoir area (Rigo, 1968), the Ute only looks about 600 feet (180 m) thick on the Porcupine Reservoir map of Berry (1989). The Ute is reportedly 1090 and 1380 feet (330 and 420 m) thick in the Sharp Mountain area (Hafen, 1961; Rigo, 1968, respectively), but these thicknesses are suspect since the Ute is thinner to the north, east, and west. We suspect that Hafen (1961) used dips that were too steep (~30 degrees vs ~16.5 degrees) so the real Ute thickness is about 620 feet (190 m) where he measured his section; we do not know what Rigo (1968) measured. North of our map area in the Hardware Ranch quadrangle, Deputy (1984) measured 681 feet (207.6 m) of Ute. To the east, the Ute is about 450 feet (137 m) thick in the Horse Ridge and Dairy Ridge quadrangles (Coogan, 2006a-b) and 515 feet (157 m) thick at the Baldy Ridge section (Rigo, 1968) in the Horse Ridge quadrangle. The thickest Ute may be near the South Fork Wolf Creek in the Huntsville quadrangle, where Coogan estimates a 1000-foot (300 m) thickness, 1150 feet (350 m) thick if steeper dip, while King estimates the Ute is about 1100 feet (335 m) thick, based on a higher Ute-Langston contact than Coogan picked. Rigo (1968) reported 1370 feet (418 m) of Ute near the South Fork Wolf Creek, but his contacts are not used on our map. To the south in the Browns Hole quadrangle, about 700 feet (210 m) of mixed shale and limestone was shown by Crittenden (1972) and his depiction is likely derived from the 659 feet (201 m) of Ute reported by Laraway (1958) along the South Fork Ogden River; this is about what Laraway (1958) mapped. But Crittenden (1972) did not map the Ute-Blacksmith contact; further, see problems above under Blacksmith Formation.

The Ute Formation as first mapped in the James Peak, Mantua, and Huntsville quadrangles was too thick because Coogan mapped the lower shale in the Langston Formation as the entire Langston, not realizing the base of the Ute is a shale above the upper carbonate (typically dolomite) of the Langston. He did this because the upper carbonate is not distinct in these quadrangles, like it is to the west in the Mount Pisgah quadrangle and to the east in the Sharp Mountain quadrangle. The same problem exists locally in the Sharp Mountain quadrangle. Though King revised the present map to place the upper Langston carbonate in the Langston, problems with this contact and Ute and Langston Formation thicknesses may persist.

Just north of our map area in the Wellsville Mountains, Maxey (1958) reported Ehmaniella(?) sp. and Glossopleura sp. trilobites in and at the base of the Ute Formation, respectively, making it Middle Cambrian. Deiss (1938) and Berry (1989) reported Ehmaniella sp. trilobites north of our map area near the Blacksmith Fork River.

***Cl, Cl?*** **-** *Langston Formation (Middle Cambrian)*. Upper part is gray, sandy dolomite and limestone that weathers to ledges and cliffs; middle part is yellowish- to reddish-brown to gray weathering, greenish-gray, fossiliferous shale and lesser interbedded gray, laminated to very thin-bedded, silty limestone (Spence Shale Member); basal part is light-brown-weathering, ledge forming gray limestone and dolomite with local poorly indurated tan, dolomitic sandstone at bottom; basal part that is less resistant (Naomi Peak Member) is present at least in northwest part of our map area; conformably overlies Geertsen Canyon Quartzite; 200 to 400 feet (60-120 m) thick. Designated “Formation” rather than “Dolomite” due to the varied lithologies.

The thickness of the Langston Formation is based on several studies. North of the map area, 410 feet (125 m) of Langston was measured along the upper Blacksmith Fork River in the Hardware Ranch quadrangle by Buterbaugh (1982). The Langston is 270 feet (80 m) thick in the Sharp Mountain area (Hafen, 1961) and to the east it is about 200 to 250 feet (60 to 75 m) thick in the Horse and Dairy Ridge quadrangles (Coogan, 2006a-b); the 85-foot (26 m) thickness reported at the Baldy Ridge section (Rigo, 1968) in the Horse Ridge quadrangle is likely incorrect. The 170 feet (50 m) of dolomite reported near Browns Hole (Crittenden, 1972) is likely only the basal dolomite of the Langston Formation; Laraway (1958) probably measured 120 feet (37 m) of this basal dolomite and 298 feet (91 m) of Langston along the South Fork Ogden River in the Browns Hole quadrangle. Laraway’s (1958) reported 398-foot (121 m) Langston thickness is likely an error, since he measured and mapped about 300 feet (90 m) of Langston. Near the South Fork Wolf Creek in the Huntsville quadrangle, the Langston is about 300 feet (90 m) thick (Coogan’s measurements), but King used a higher contact on our map making the Langston about 390 feet (120 m) thick. Farther west the Langston is about 400 to 460 feet (120-140 m) thick (see Ezell, 1953; Maxey, 1958; Rigo, 1968; Buterbaugh, 1982).

Just north of the map area near the Blacksmith Fork River, the Langston trilobite fauna (Glossopleura zone) is Middle Cambrian in age (Maxey, 1958), and near Brigham City, the fauna (Glossopleura trilobite zone in Spence Shale, Albertella trilobite zone in Naomi Peak) is earliest Middle Cambrian in age (Maxey, 1958; Jensen and King, 1996, table 2).

***Cgc, Cgc?*** - *Geertsen Canyon Quartzite (Middle and Lower Cambrian and possibly Neoproterozoic).* In the west mostly buff (off-white and tan) quartzite, with pebble conglomerate beds; pebbles are mostly rounded light colored quartzite; contains cross bedding, and pebble layers and lenses; colors vary from tan and light to medium gray, with pinkish, orangish, reddish, and purplish hues; outcrops darker than these fresh quartzite colors; cliff forming; some brown-weathering, interbedded micaceous argillite and quartzite common at top and mappable locally; pebble to cobble conglomerate lenses more abundant in middle part of quartzite, and basal, very coarse-grained arkose locally; near Huntsville, total thickness about 4200 feet (1280 m), including upper argillite about 375 feet (114 m) thick and basal coarse-grained arkose (arkosic to feldspathic quartzite) about 300 to 400 feet (90-120 m) thick (Crittenden and others, 1971). Overall seems to be thinner near Browns Hole. Called Prospect Mountain Quartzite and Pioche Shale (argillite at top) by some previous workers.

Upper and lower parts of Crittenden and others (1971; Crittenden, 1972; Sorensen and Crittenden, 1979) are not mappable outside the Browns Hole and Huntsville quadrangles, likely because the marker cobble conglomerate and change in grain size and feldspar content reported by Crittenden and others (1971) is not at a consistent horizon; quartz-pebble conglomerate beds are present in most of the Geertsen Canyon Quartzite.

To the east on leading margin of Willard thrust sheet, the Geertsen Canyon is thinner, an estimated 3200 feet (975 m) total thickness (Coogan, 2006a-b), and may be divided into different members, though informal members to west and east are based on conglomerate lenses near member contact and feldspathic lower member (see Crittenden and others, 1971; Coogan, 2006a-b).

Lower part in west (Cgcl, Cgcl?) is typically conglomeratic and feldspathic quartzite (only up to 20% feldspar reported by Crittenden and Sorensen, 1985a, so not an arkosic), with 300- to 400-foot (90-120 m), basal, very coarse-grained, more feldspathic or arkosic quartzite; 1175 to 1700 feet (360-520 m) thick (Crittenden and others, 1971; Crittenden, 1972; Sorensen and Crittenden, 1979) and at least 200 to 400 feet (60-120 m) thinner near Browns Hole (compare Crittenden, 1972 to Sorensen and Crittenden, 1979). Unit queried where poor exposures may actually be surficial deposits.

***Zm, Zm?*** *- Mutual Formation (Neoproterozoic).* Grayish-red to purplish-gray, medium to thick-bedded quartzite with pebble conglomerate lenses; also reddish-gray, pink, tan, and light-gray in color and typically weathering to darker shades than, but at least locally indistinguishable from, Geertsen Canyon Quartzite; commonly cross-bedded and locally feldspathic; contains argillite beds and, in the James Peak quadrangle, a locally mappable medial argillite unit; 435 to 1200 feet (130-370 m) thick in Browns Hole quadrangle (Crittenden, 1972) and thinnest near South Fork Ogden River (W. Adolph Yonkee, Weber State University, verbal communication, 2006); thicker to northwest, up to 2600 feet (800 m) thick in Huntsville quadrangle (Crittenden and others, 1971) and 2556 feet (780 m) thick in James Peak quadrangle (Blau, 1975); may be as little as 300 feet (90 m) thick south of the South Fork Ogden River (King this report); absent or thin on leading edge of Willard thrust sheet (see unit Zm?c); thins to south and east.

***Zi, Zi?*** *- Inkom Formation (Neoproterozoic).* Overall gray to reddish-gray weathering, poorly resistant, psammite and argillite, with gray-weathering meta-tuff lenses in lower part; upper half dominantly dark green, very fine-grained meta-sandstone (psammite) with lower half olive gray to lighter green-gray, greenish gray-weathering, laminated, micaceous meta-siltstone (argillite); lower greenish-weathering part missing near South Fork Ogden River and the Inkom is less than 200 feet (60 m) thick; in Mantua quadrangle, Inkom typically 300 feet (90 m) thick, and is only less than 200 feet (60 m) thick where faulted (King this report); 360 to 450 feet (110-140 m) thick northeast of Huntsville (Crittenden and others, 1971), and absent on leading edge of Willard thrust sheet (Coogan, 2006a); location of "pinch-out" not exposed.

***Zcc, Zcc?*** *- Caddy Canyon Quartzite (Neoproterozoic).* Mostly vitreous, almost white, cliff-forming quartzite; colors vary and are tan, light-gray, pinkish-gray, greenish-gray, and purplish-gray, that are typically lighter shades than the Geertsen Canyon Quartzite; 1000 to 2500 feet (305-760 m) thick in west part of our map area, thickest near Geertsen Canyon in Huntsville quadrangle (Crittenden and others, 1971; Crittenden, 1972); 1500 feet (460 m) thick near South Fork Ogden River (Coogan and King, 2006); thinner, 725 to 1300 feet (220-400 m) thick, and less vitreous on leading edge of Willard thrust sheet. Lower contact with Kelley Canyon Formation is gradational with brownish-gray quartzite and argillite beds over a few tens to more than 200 feet (3-60 m) (see Crittenden and others, 1971). Where thick, this gradational-transitional zone is what is mapped as the Papoose Creek Formation. Near Geertsen Canyon, this transition zone is 600 feet (180 m) thick and was mapped with and included in the Caddy Canyon Quartzite by Crittenden and others (1971, figure 7), and in the Caddy Canyon and Kelley Canyon Formations by Crittenden (1972, see lithologic column).

***Zkc, Zkc?*** *- Kelley Canyon Formation (Neoproterozoic).* Dark-gray to black, gray to olive-gray-weathering argillite to phyllite, with rare metacarbonate (for example basal meta-dolomite); grades into overlying Caddy Canyon quartzite with increasing quartzite; gradational interval mapped as Papoose Creek Formation (Zpc); 1000 feet (300 m) thick in Mantua quadrangle (this report), where Papoose Creek Formation is mapped separately, and reportedly 2000 feet (600 m) thick near Huntsville (Crittenden and others, 1971, figure 7), but only shown as about 1600 feet (500 m) thick to Papoose Creek transition zone by Crittenden (1972). The Kelley Canyon Formation is prone to slope failures.

*Citations, tables, and/or figures noted above are not provided herein, but are in Coogan and King (2016).*

Figure 2 shows two strike and dip measurements in Mutual Formation bedrock in the area that shallow eastward: (1) N5° E 68° SE about 600 feet west of the site, and (2) N11° E 8° SE about 1,100 feet to the northeast. Two thrust faults are also mapped trending through the Mutual Formation to the north of the site, and bounding the unit to the south. These thrusts mark the leading edge of the Willard Thrust sheet.

**Seismotectonic Setting**
The site is located slightly south of the divide between Ogden and Cache Valleys, which are to the south and north, respectively. Cache Valley is a major sediment-filled, north-south-trending intermontane valley flanked by the Bear River Range to the east and the Wellsville Mountains to the west. Ogden Valley is a roughly 40 square-mile back valley within the Wasatch Range described by Gilbert (1928) as a structural trough similar to Cache and Morgan Valleys to the north and south, respectively. Both valleys are in a transition zone between the Basin and Range and Middle Rocky Mountains provinces (Stokes, 1977, 1986). The Basin and Range is characterized by a series of generally north-trending elongate mountain ranges, separated by predominately alluvial and lacustrine sediment-filled valleys and typically bounded on one or both sides by major normal faults (Stewart, 1978). The boundary between the Basin and Range and Middle Rocky Mountains provinces is the prominent, west-facing escarpment along the Wasatch fault zone at the base of the Wasatch Range. Late Cenozoic normal faulting, a characteristic of the Basin and Range, began between about 17 and 10 million years ago in the Nevada (Stewart, 1980) and Utah (Anderson, 1989) portions of the province. The faulting is a result of a roughly east-west directed, regional extensional stress regime that has continued to the present (Zoback and Zoback, 1989; Zoback, 1989).

Ogden and Cache Valleys are morphologically similar to valleys in the Basin and Range, but exhibit less structural relief (Sullivan and others 1988). Ogden Valley occupies a structural trough created by vertical displacement on normal faults bounding the east and west sides of the valley. The most recent movement on these faults is pre-Holocene (Sullivan and others, 1986). Cache Valley is a similar structural trough, and is bounded by the active West Cache fault zone at the base of the Malad Range and Wellsville Mountains on the west, and the East Cache fault zone at the base of the Bear River Range on the east. The most-recent, large-magnitude surface faulting earthquake on the West Cache fault zone occurred between 4,400 and 4,800 years ago (Black and others, 2000), whereas the most-recent event on the East Cache fault zone occurred about 4,000 years ago (McCalpin, 1994).

No active faults (those with evidence for Holocene activity) are mapped at the Project. However, the Project is situated near the central portion of the Intermountain Seismic Belt (ISB). The ISB is a north-south-trending zone of historical seismicity along the eastern margin of the Basin and Range province which extends for approximately 900 miles from northern Arizona to northwestern Montana (Sbar and others, 1972; Smith and Sbar, 1974). At least 16 earthquakes of magnitude 6.0 or greater have occurred within the ISB since 1850, with the largest of these events the $M_S$ 7.5 1959 Hebgen Lake, Montana earthquake. However, none of these events have occurred along the Wasatch fault zone or other known late Quaternary faults in the region (Arabasz and others, 1992; Smith and Arabasz, 1991). The closest of these events to the site was the 1934 Hansel Valley ($M_S$ 6.6) event north of the Great Salt Lake and south of the town of Snowville.

## SITE CHARACTERIZATION

### Empirical Observations

On July 1, 2016, Bill D. Black of Western GeoLogic conducted a reconnaissance of the property. Weather at the time of the site reconnaissance was clear and sunny with temperatures in the 70's (°F). The site is in Powder Mountain Ski Area near the divide between Ogden and Cache Valleys to the north and south, respectively. Slopes at the site are steep and generally dip toward the south at an overall gradient of about 2.5:1 (horizontal:vertical). Native vegetation consists mainly of aspen trees, brush, weeds, and grasses. West of the site an area of low-relief quartzite bedrock was observed above (north of) Aspen Drive. This bedrock area bounds the eastern side of a south-trending swale vegetated only by grasses and low brush. The bedrock was observed to extend further northward above the upper loop of Alpine Drive. No bedrock outcrops were evident directly upslope of the site, no evidence of ongoing or recent slope instability, landslides, rockfalls, or other geologic hazards was observed.

### Air Photo Observations

Aerial photography from 2014 available from the Utah AGRC (Figure 3) was reviewed to obtain information about the geomorphology of the Project area. No LIDAR coverage was available. No geologic hazards were evident at the site or in adjacent areas on the photo. Several areas of low-relief quartzite bedrock are evident to the west of the site that bound the eastern and western sides of a shallow swale formed either by avalanches or surface drainage from the bedrock areas. The swale trends downslope to the south toward the head of South Fork Wolf Creek.

### Subsurface Investigation

Three walk-in test pits were excavated at the property on July 1, 2016 to evaluate subsurface conditions. Figure 4 is a site plan at a scale of one inch equals 30 feet (1:360) showing the site boundaries, surveyed topography, the proposed home location and footprint, and locations of the test pits. Figures 5A-C are logs of the test pits at a scale of 1 inch equals five feet (1:60). All three test pits exposed a similar sequence of slope colluvium in which the modern A-horizon was forming, overlying weathered quartzite bedrock that caused backhoe refusal at depths of 4.7 to 6.1 feet. We anticipate the bedrock refusal depths to be approximately the thickness of the weathered C profile. No strike and dips could be measured to the limited exploration depths, but bedrock layers were observed in test pit TP-2 (Figure 5B) dipping toward the east at about 45 degrees and a clayey argillite layer was observed in the east wall of TP-1 that dipped slightly to the south. No evidence of groundwater or geologic hazards was observed.

### Cross Section

Figure 6 shows a cross section across the slope at the site at a scale of 1 inch equals 10 feet with no vertical exaggeration. The profile location is shown on Figure 4. The upper elevation of the profile is not in an area of surveyed topography, thus we interpolated this elevation based on the difference in digital elevation between the northwest and southwest site corners, and the surveyed elevation of the southwest site corner. Units and contacts are inferred based on the subsurface data discussed above. The cross section shows the site is underlain by a surficial veneer of slope colluvium overlying quartzite bedrock of the Mutual Formation, which would dip slightly to the south and away from the viewer at around 45-50 degrees.

## GEOLOGIC HAZARDS

Assessment of potential geologic hazards and the resulting risks imposed is critical in determining the suitability of the site for development. Table 1 below shows a summary of the geologic hazards reviewed at the site, as well as a relative (qualitative) assessment of risk to the Project for each hazard. A “high” hazard rating (H) indicates a hazard is present at the site (whether currently or in the geologic past) that is likely to pose significant risk and/or may require further study or mitigation techniques. A “moderate” hazard rating (M) indicates a hazard that poses an equivocal risk. Moderate-risk hazards may also require further studies or mitigation. A “low” hazard rating (L) indicates the hazard is not present, poses little or no risk, and/or is not likely to significantly impact the Project. Low-risk hazards typically require no additional studies or mitigation. We note that these hazard ratings represent a conservative assessment for the entire site and risk may vary in some areas. Careful selection of development areas can minimize risk by avoiding known hazard areas.

**Table 1.** *Geologic hazards summary.*

| Hazard | H | M | L | …Hazard Rating |
|---|---|---|---|---|
| **Earthquake Ground Shaking** | X | | | |
| **Surface Fault Rupture** | | | X | |
| **Liquefaction and Lateral-spread Ground Failure** | | | X | |
| **Tectonic Deformation** | | | X | |
| **Seismic Seiche and Storm Surge** | | | X | |
| **Stream Flooding** | | | X | |
| **Shallow Groundwater** | | | X | |
| **Landslides and Slope Failures** | | X | | |
| **Debris Flows and Floods** | | | X | |
| **Rock Fall** | | | X | |
| **Problem Soil** | | | X | |

### Earthquake Ground Shaking

Ground shaking refers to the ground surface acceleration caused by seismic waves generated during an earthquake. Strong ground motion is likely to present a significant risk during moderate to large earthquakes located within a 60 mile radius of the project area (Boore and others, 1993). Seismic sources include mapped active faults, as well as a random or “floating” earthquake source on faults not evident at the surface. Mapped active faults within this distance include the East and West Cache fault zones; the Brigham City, Weber, Salt Lake, and Provo segments of the Wasatch fault zone; the East Great Salt Lake fault zone; the Morgan fault; the West Valley fault zone; the Oquirrh fault zone; and the Bear River fault zone (Black and others, 2003).

The extent of property damage and loss of life due to ground shaking depends on factors such as: (1) proximity of the earthquake and strength of seismic waves at the surface (horizontal motions are the most damaging); (2) amplitude, duration, and frequency of ground motions; (3) nature of foundation materials; and (4) building design (Costa and Baker, 1981). Assuming 2012/2015 IBC design codes, a site class of B (rock), and a risk category of II, USGS calculated uniform-hazard and deterministic ground motion values with a 2% chance of exceedance in 50 years are as follows:

**Table 2.** *Seismic hazards summary.*
*(Site Location: 41.38035° N, - 111.78527° W)*

| | |
|---|---|
| $S_S$ | *0.858g* |
| $S_1$ | *0.287g* |
| $S_{MS}$ ($F_a$ x $S_S$) | *0.858g* |
| $S_{M1}$ ($F_v$ x $S_1$) | *0.287g* |
| $S_{DS}$ (2/3 x $S_{MS}$) | *0.572g* |
| $S_{D1}$ (2/3 x $S_{M1}$) | *0.191g* |
| Site Coefficient, $F_a$ | *=1.000* |
| Site Coefficient, $F_v$ | *=1.000* |

Given the above information, earthquake ground shaking is a high risk to the site. The hazard from earthquake ground shaking can be adequately mitigated by prudent design and construction.

**Surface Fault Rupture**
Movement along faults at depth generates earthquakes. During earthquakes larger than Richter magnitude 6.5, ruptures along normal faults in the intermountain region generally propagate to the surface (Smith and Arabasz, 1991) as one side of the fault is uplifted and the other side down dropped. The resulting fault scarp has a near-vertical slope. The surface rupture may be expressed as a large singular rupture or several smaller ruptures in a broad zone. Ground displacement from surface fault rupture can cause significant damage or even collapse to structures located on an active fault.

The nearest active fault to the site is the Weber segment of the WFZ about 8.6 miles to the west, and no evidence of active surface faulting is mapped or was evident at the site. Based on this, the hazard from surface faulting is rated as low.

**Liquefaction and Lateral-spread Ground Failure**
Liquefaction occurs when saturated, loose, cohesionless, soils lose their support capabilities during a seismic event because of the development of excessive pore pressure.

Earthquake-induced liquefaction can present a significant risk to structures from bearing-capacity failures to structural footings and foundations, and can damage structures and roadway embankments by triggering lateral spread landslides. Earthquakes of Richter magnitude 5 are generally regarded as the lower threshold for liquefaction. Liquefaction potential at the site is a combination of expected seismic (earthquake ground shaking) accelerations, groundwater conditions, and presence of susceptible soils.

No soils likely susceptible to liquefaction were observed in the test pit exposures at the site, and given that bedrock is shallow no susceptible soils are likely present. Based on this, the hazard from liquefaction and lateral spreading is rated as low.

**Tectonic Deformation**
Tectonic deformation refers to subsidence from warping, lowering, and tilting of a valley floor that accompanies surface-faulting earthquakes on normal faults. Large-scale tectonic subsidence may accompany earthquakes along large normal faults (Lund, 1990). Tectonic subsidence is believed to mainly impact those areas immediately adjacent to the downthrown side of a normal fault. The site is not on the downthrown side of any active faults, and therefore the risk from tectonic subsidence is low.

**Seismic Seiche and Storm Surge**
Earthquake-induced seiche presents a risk to structures within the wave-oscillation zone along the edges of large bodies of water, such as the Great Salt Lake. Given the elevation of the subject property and distance from large bodies of water, the risk to the subject property from seismic seiches is rated as low.

**Stream Flooding**
Stream flooding may be caused by direct precipitation, melting snow, or a combination of both. In much of Utah, floods are most common in April through June during spring snowmelt. High flows may be sustained from a few days to several weeks, and the potential for flooding depends on a variety of factors such as surface hydrology, site grading and drainage, and runoff.

No active drainages cross the site or were evident and the hazard from stream flooding is low. However, site hydrology and runoff should be addressed in the civil engineering design and grading plan for the Project to ensure that proper drainage is maintained.

**Shallow Groundwater**
No springs are shown on the topographic map for the site or were reported or observed, and no evidence for shallow groundwater was observed in the test pit exposures to the depth explored. It is likely that groundwater flow in the site vicinity is dominated by fracture flow through bedrock, although given the sites alpine location it is possible that shallow groundwater may occur seasonally following snowmelt in the colluvial veneer. However, we do not anticipate shallow groundwater to pose a significant site constraint and rate the risk as low.

**Landslides and Slope Failures**
Slope stability hazards such as landslides, slumps, and other mass movements can develop along moderate to steep slopes where a slope has been disturbed, the head of a slope loaded, or where increased groundwater pore pressures result in driving forces within the slope exceeding restraining forces. Slopes exhibiting prior failures, and also deposits from large landslides, are particularly vulnerable to instability and reactivation.

No landslides are mapped at the site or in the area, and no evidence for landslides or ongoing slope instability was observed at the site during our reconnaissance. However, slopes at the site are steep. We therefore rate the risk from landslides as moderate. We recommend stability of the slopes be evaluated in a geotechnical engineering evaluation prior to building based on site specific data and subsurface information included in this report. Recommendations for reducing the risk from landsliding should be provided if factors of safety are determined to be unsuitable. The stability evaluation should take into account possible shallow groundwater from seasonal fluctuations, and care should also be taken that site grading does not destabilize slopes in this area without prior geotechnical analysis and grading plans.

**Debris Flows**
Debris flow hazards are typically associated with unconsolidated alluvial fan deposits at the mouths of large range-front drainages, such as those along the Wasatch Front. Debris flows have historically significant damage in the Wasatch Front area. No evidence for debris-flow channels, levees, or other debris-flow features was observed at the site or on air photos. Based on the above, we rate the existing risk from debris flows at the site as low.

**Rock Fall**
No bedrock outcrops were observed at the site or in higher slopes that could present a source area for rock fall clasts. Based on the above, we rate the hazard from rock falls as low. The outcrops to the west and northwest are low in relief and currently appear incapable of generating significant rockfalls.

**Swelling and Collapsible Soils**
Surficial soils that contain certain clays can swell or collapse when wet. Given the subsurface conditions observed at the site, bedrock appears shallow and the surficial colluvium appeared sandy. The bedrock may contain intermittent indurated clay (argillite) layers, such as observed in TP-3 (Figure 5C), although no such layers were observed in TP-2. We note that this layer would be at considerable depth beneath the proposed home given the bedrock dip and distance of the home from TP-3. However, a geotechnical engineering evaluation should be performed to confirm soil conditions and provide specific recommendations for site grading, subgrade preparation, and footing and foundation design.

## CONCLUSIONS AND RECOMMENDATIONS

Earthquake ground shaking is identified as the only geologic hazard posing a high relative risk to the Project. The risk from slope failures is also rated as moderate given that slopes at the site are steep. The following recommendations are provided to reduce risk from these hazards and for proper site development:

- ***Excavation Inspection*** - This report does not reflect subsurface variations that may occur laterally away from exploration test pits. The nature and extent of such variations may not become evident until the course of construction, and are sometimes sufficient to necessitate structural or site plan changes. Thus, we recommend that we inspect the building footing or foundation excavation to recognize any differing conditions that could affect the performance of the planned structure.

- ***Geotechnical Investigation*** **-** A design-level geotechnical engineering study should be conducted prior to construction to: (1) address soil conditions at the site for use in foundation design, site grading, and drainage; (2) provide recommendations regarding building design to reduce risk from seismic acceleration; and (3) evaluate stability of slopes at the site, including providing recommendations for reducing the risk of landsliding if the factors of safety are deemed unsuitable, based on the geologic characterizations provided in this report and site-specific geotechnical data. The stability evaluation should account for possible seasonal groundwater fluctuations.

- ***Excavation Backfill Considerations*** **-** The test pits may be in areas where structures could subsequently be placed. However, backfill may not have been replaced in the excavations in compacted layers. The fill could settle with time and upon saturation. Should structures be located in an excavated area, no footings or structure should be founded over the excavations unless the backfill has been removed and replaced with structural fill, if the fill is to support a structure.

- ***Availability of Report*** **-** The report should be made available to architects, building contractors, and in the event of a future property sale, real estate agents and potential buyers. This report should be referenced for information on technical data only as interpreted from observations and not as a warranty of conditions throughout the site. The report should be submitted in its entirety, or referenced appropriately, as part of any document submittal to a government agency responsible for planning decisions or geologic review. Incomplete submittals void the professional seals and signatures we provide herein. Although this report and the data herein are the property of the client, the report format is the intellectual property of Western Geologic and should not be copied, used, or modified without express permission of the authors.

## LIMITATIONS

This investigation was performed at the request of the Client using the methods and procedures consistent with good commercial and customary practice designed to conform to acceptable industry standards. The analysis and recommendations submitted in this report are based upon the data obtained from site-specific observations and compilation of known geologic information. This information and the conclusions of this report should not be interpolated to adjacent properties without additional site-specific information. In the event that any changes are later made in the location of the proposed site, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or approved in writing by the engineering geologist.

This report has been prepared by the staff of Western GeoLogic for the Client under the professional supervision of the principal and/or senior staff whose seal(s) and signatures appear hereon. Neither Western GeoLogic, nor any staff member assigned to this investigation has any interest or contemplated interest, financial or otherwise, in the subject or surrounding properties, or in any entity which owns, leases, or occupies the subject or surrounding properties or which may be responsible for environmental issues identified during the course of this investigation, and has no personal bias with respect to the parties involved.

The information contained in this report has received appropriate technical review and approval. The conclusions represent professional judgment and are founded upon the findings of the investigations identified in the report and the interpretation of such data based on our experience and expertise according to the existing standard of care. No other warranty or limitation exists, either expressed or implied.

The investigation was prepared in accordance with the approved scope of work outlined in our proposal for the use and benefit of the Client; its successors, and assignees. It is based, in part, upon documents, writings, and information owned, possessed, or secured by the Client. Neither this report, nor any information contained herein shall be used or relied upon for any purpose by any other person or entity without the express written permission of the Client. This report is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of Western GeoLogic.

In expressing the opinions stated in this report, Western GeoLogic has exercised the degree of skill and care ordinarily exercised by a reasonable prudent environmental professional in the same community and in the same time frame given the same or similar facts and circumstances. Documentation and data provided by the Client, designated representatives of the Client or other interested third parties, or from the public domain, and referred to in the preparation of this assessment, have been used and referenced with the understanding that Western GeoLogic assumes no responsibility or liability for their accuracy. The independent conclusions represent our professional judgment based on information and data available to us during the course of this assignment. Factual information regarding operations, conditions, and test data provided by the Client or their representative has been assumed to be correct and complete. The conclusions presented are based on the data provided, observations, and conditions that existed at the time of the field exploration.

It has been a pleasure working with you on this project. Should you have any questions, please call.

Sincerely,
Western GeoLogic, LLC

LICENSED PROFESSIONAL GEOLOGIST
07-21-2016
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Craig V. Nelson, P.G.
Principal Engineering Geologist

**ATTACHMENTS**

Figure 1. Location Map (8.5"x11")
Figure 2. Geologic Map (8.5"x11")
Figure 3. Air Photo (8.5"x11")
Figure 4. Site Plan (8.5"x11")
Figures 5A-C. Test Pit Logs (three 8.5"x11" sheets)
Figure 6. Cross Section (11"x17")

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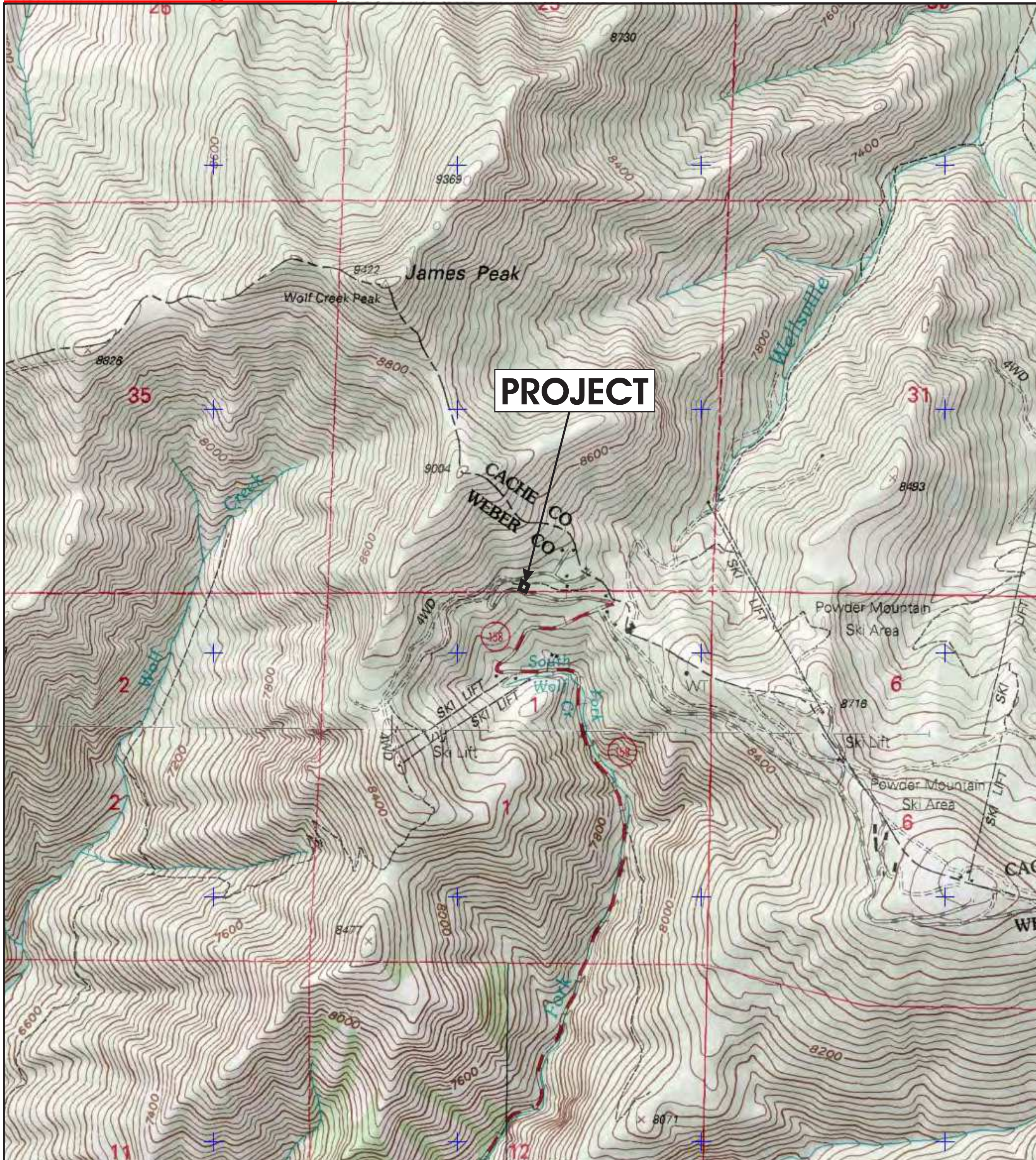



Source: U.S. Geological Survey 7.5 Minute Series Topographic Maps, Utah - James Peak, 1998;
Project location SE1/4, Section 36, T8N, R1E (SLBM).

## LOCATION MAP

WESTERN GEOLOGIC

N W E S

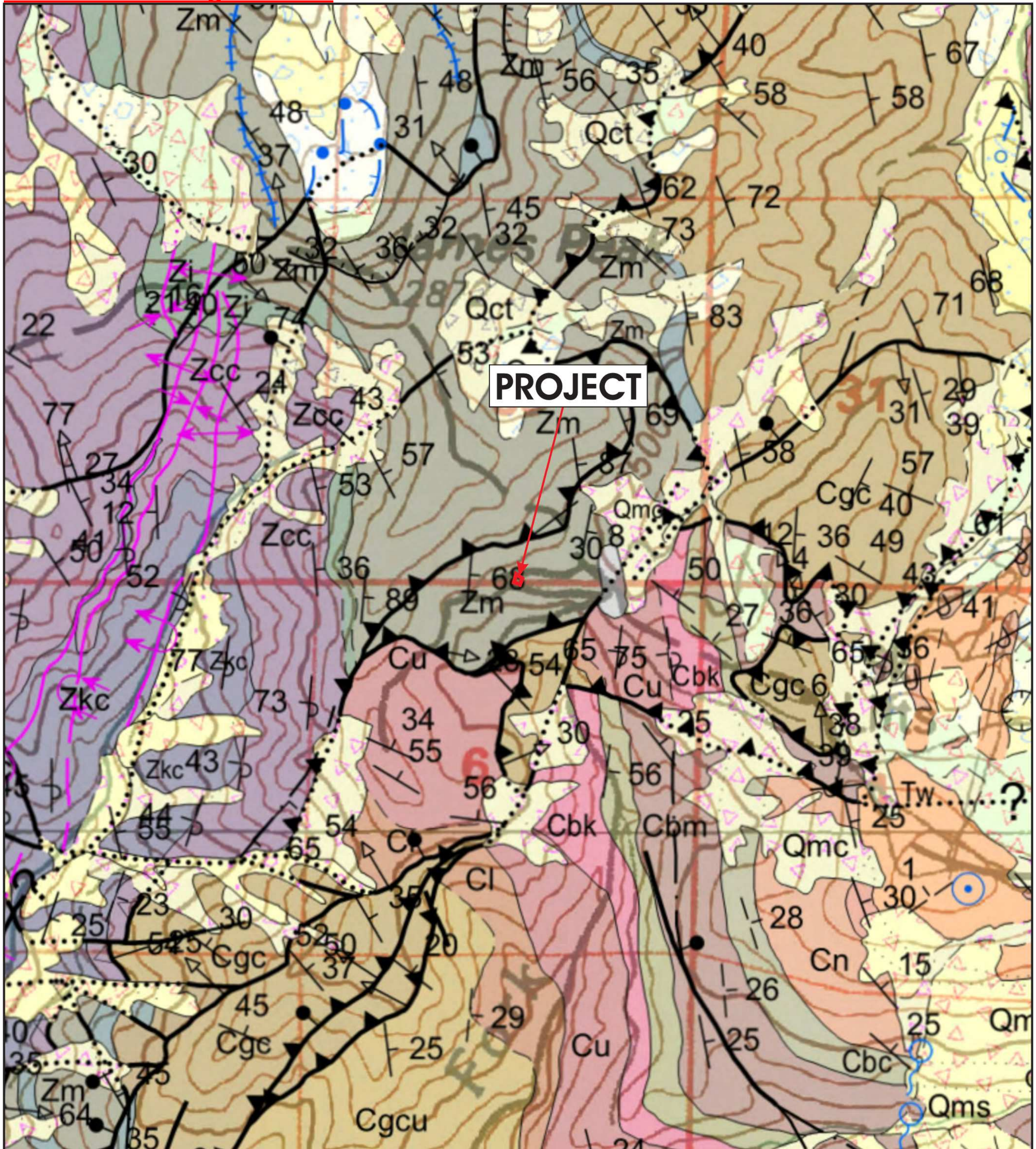
0 1000 2000 feet

Scale 1:24,000
(1 inch = 2000 feet)

### GEOLOGIC HAZARDS EVALUATION

Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 1**




Source: Coogan and King (2016); original map scale 1:100,000. See text for explanation of nearby surficial geologic units.

WESTERN GeoLogic

N W E S

0 1000 2000 feet

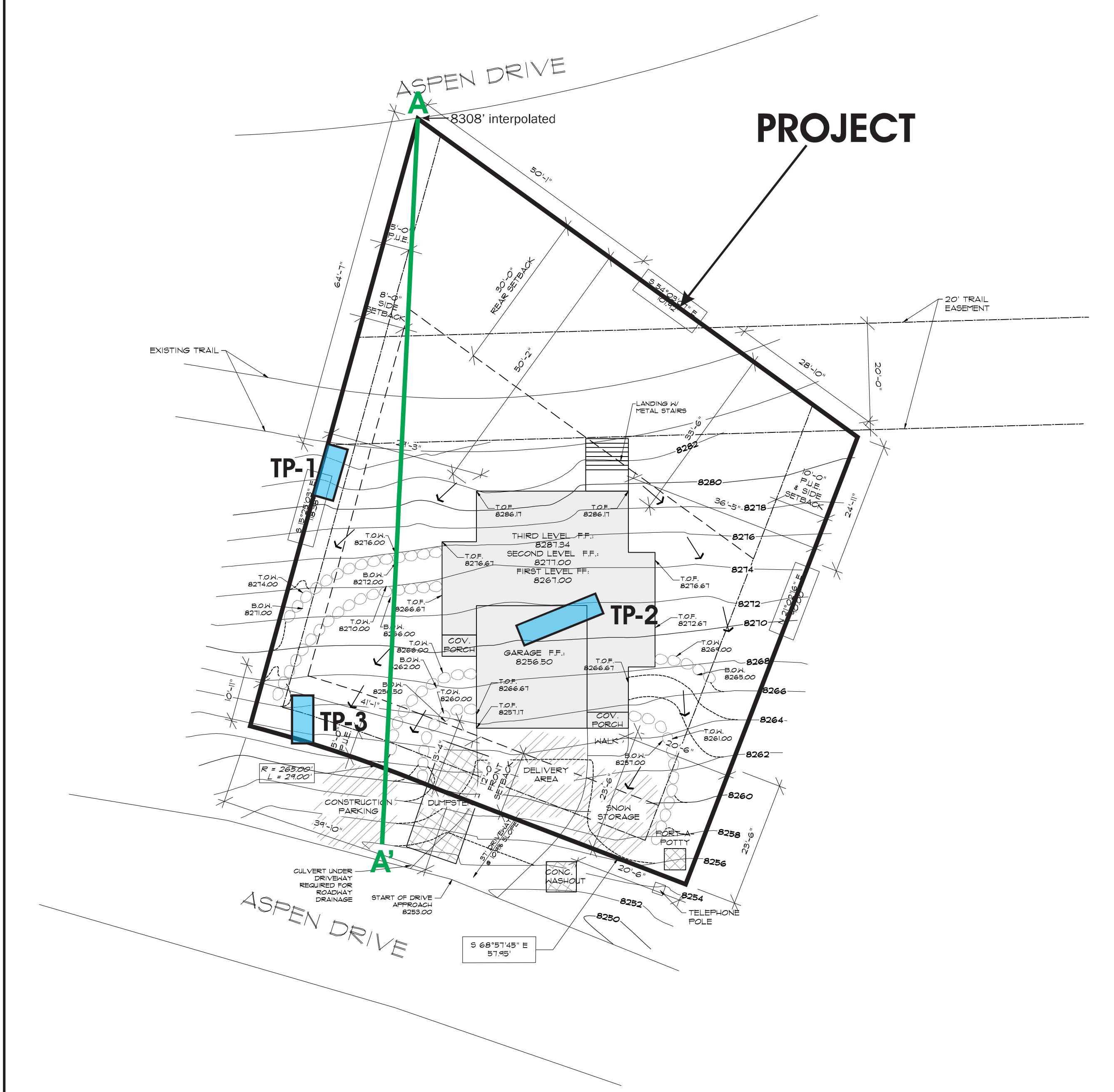
Scale 1:24,000
(1 inch = 2000 feet)

## GEOLOGIC MAP

### GEOLOGIC HAZARDS EVALUATION

Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 2**




## SITE PLAN

## GEOLOGIC HAZARDS EVALUATION

Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

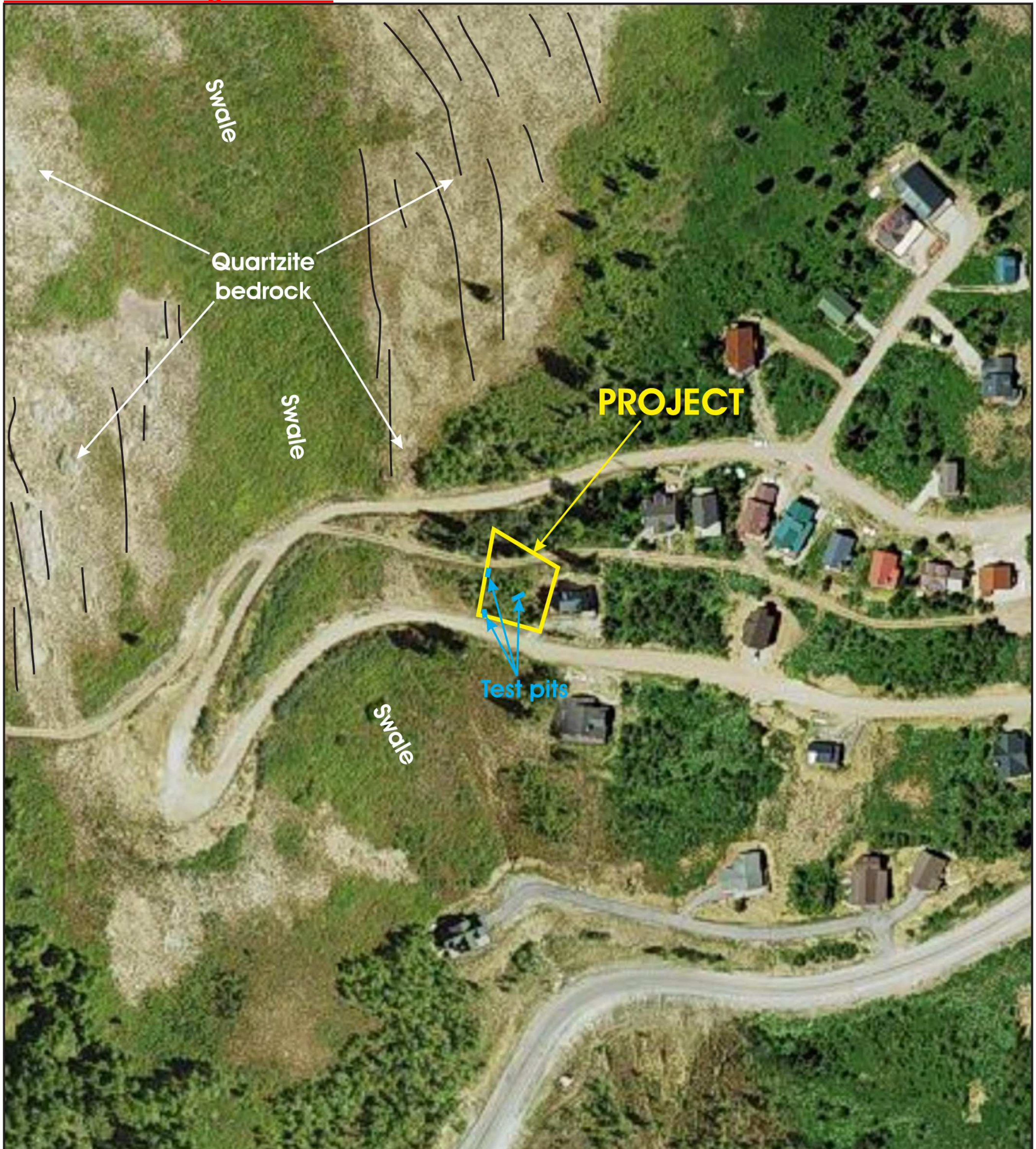
**FIGURE 3**

N W E S

0 15 30 feet

Scale 1:360
(1 inch = 30 feet)

WESTERN GEOLOGIC




Source: Utah AGRC, NAIP, 1 meter resolution, 2014.

WESTERN GEOLOGIC

N W E S

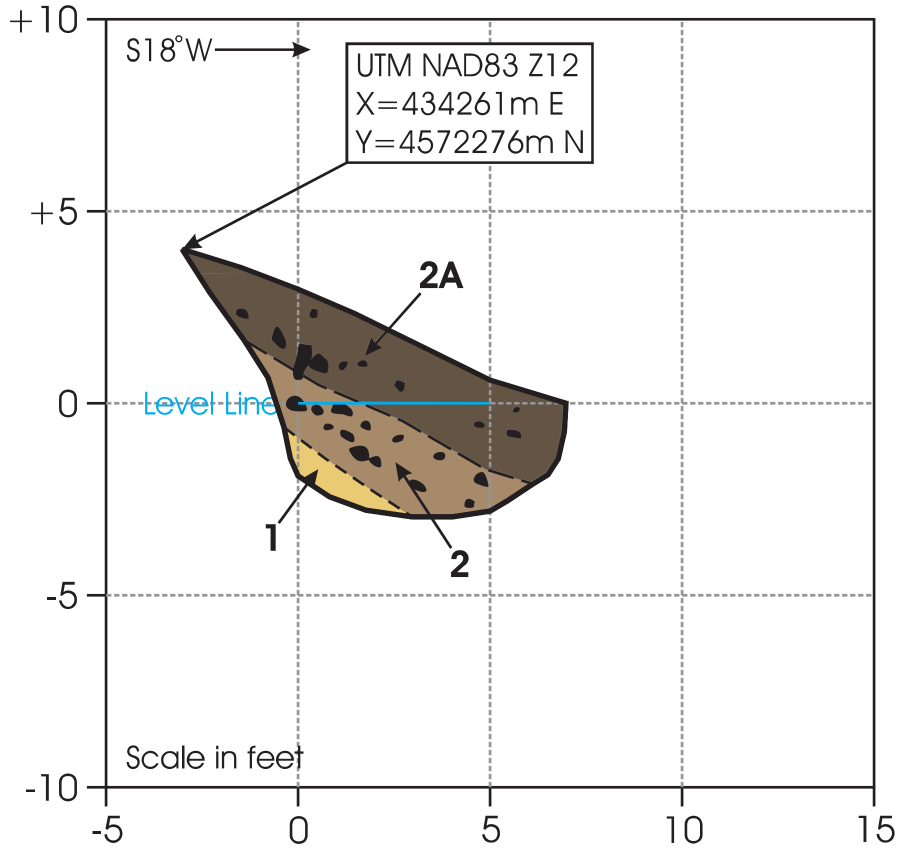
0 100 200 feet

Scale 1:2,400
(1 inch = 200 feet)

## AIR PHOTO

**GEOLOGIC HAZARDS EVALUATION**
Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 4**




**UNIT DESCRIPTIONS**

**Unit 1.** *Precambrian Mutual Formation* - Weathered, dense, massive, buff-colored quartzite; caused backhoe refusal at about 4.7 feet deep.

**Unit 2.** *Holocene Slope Colluvium* - Likely slope wash comprised of organic-enriched, brown to dark brown, root-penetrated, moderate density, massive, sand with silt, gravel, and cobbles; clasts subangular quartzite with stage II carbonate.

**2A.** Modern A-horizon soil formed in unit 2.

SCALE: 1 inch = 5 feet
(no vertical exaggeration)
East Wall Logged, North to South

Logged by Bill D. Black, P.G.
on July 1, 2016
Reviewed by
Craig V. Nelson, P.G.

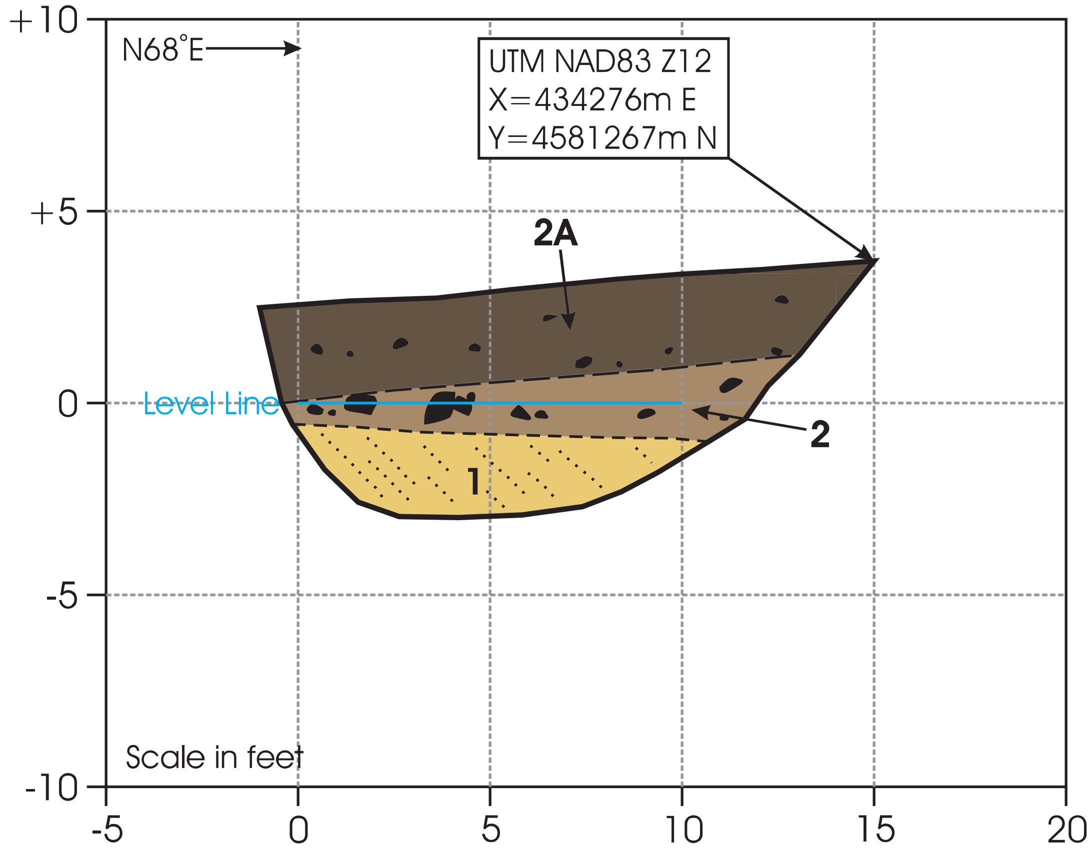
WESTERN GEOLOGIC

**TEST PIT 1 LOG**

**GEOLOGIC HAZARDS EVALUATION**

Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 5A**




**UNIT DESCRIPTIONS**

**Unit 1.** *Precambrian Mutual Formation* - Weathered, dense, poorly bedded, orange- to buff-colored quartzite; caused backhoe refusal at about 5.8 feet deep; bedding dips to east at about 45 degrees, but strike could not be confidently measured due lack of exposure depth.

**Unit 2.** *Holocene Slope Colluvium* - Likely slope wash comprised of organic-enriched, brown to dark brown, root-penetrated, moderate density, massive, sand with silt, gravel, and cobbles; clasts subangular quartzite with stage II carbonate.

**2A.** Modern A-horizon soil formed in unit 2.

WESTERN GEOLOGIC

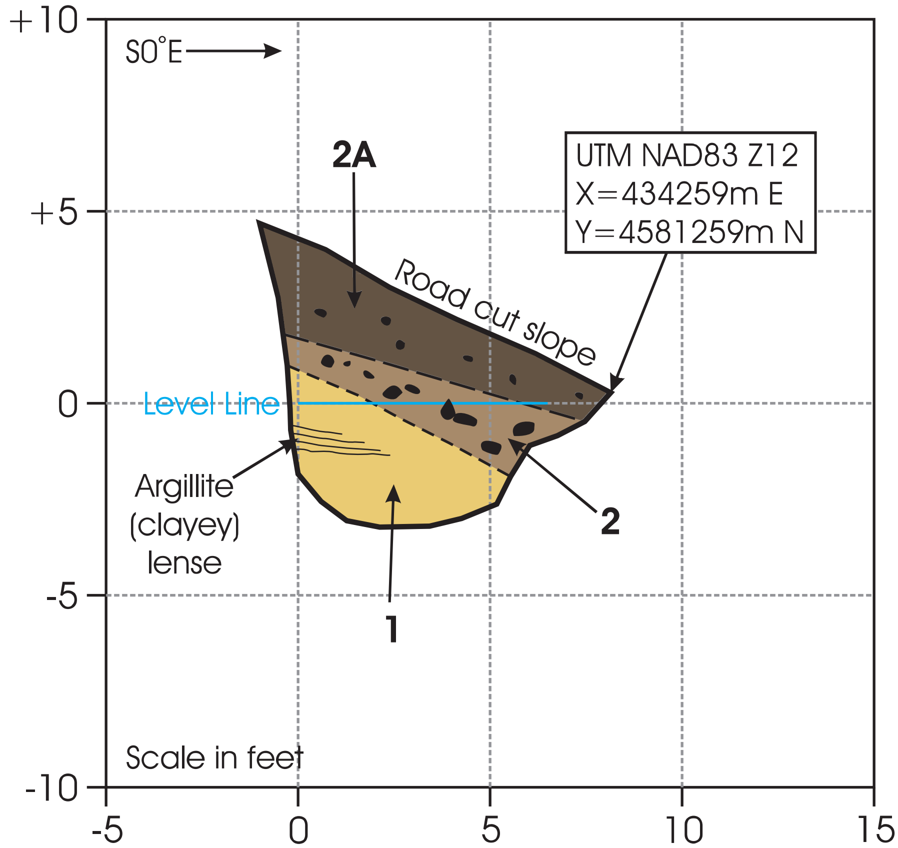
SCALE: 1 inch = 5 feet
(no vertical exaggeration)
North Wall Logged, West to East

Logged by Bill D. Black, P.G.
on July 1, 2016
Reviewed by
Craig V. Nelson, P.G.

**TEST PIT 2 LOG**

**GEOLOGIC HAZARDS EVALUATION**
Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 5B**




**UNIT DESCRIPTIONS**

**Unit 1.** *Precambrian Mutual Formation* - Weathered, dense, massive, buff-colored quartzite with discontinuous argillate (indurated clay) lense; caused backhoe refusal at about 6.1 feet deep.

**Unit 2.** *Holocene Slope Colluvium* - Likely slope wash comprised of organic-enriched, brown to dark brown, root-penetrated, moderate density, massive, sand with silt, gravel, and cobbles; clasts subangular quartzite with stage II carbonate.

**2A.** Modern A-horizon soil formed in unit 2.

WESTERN GEOLOGIC

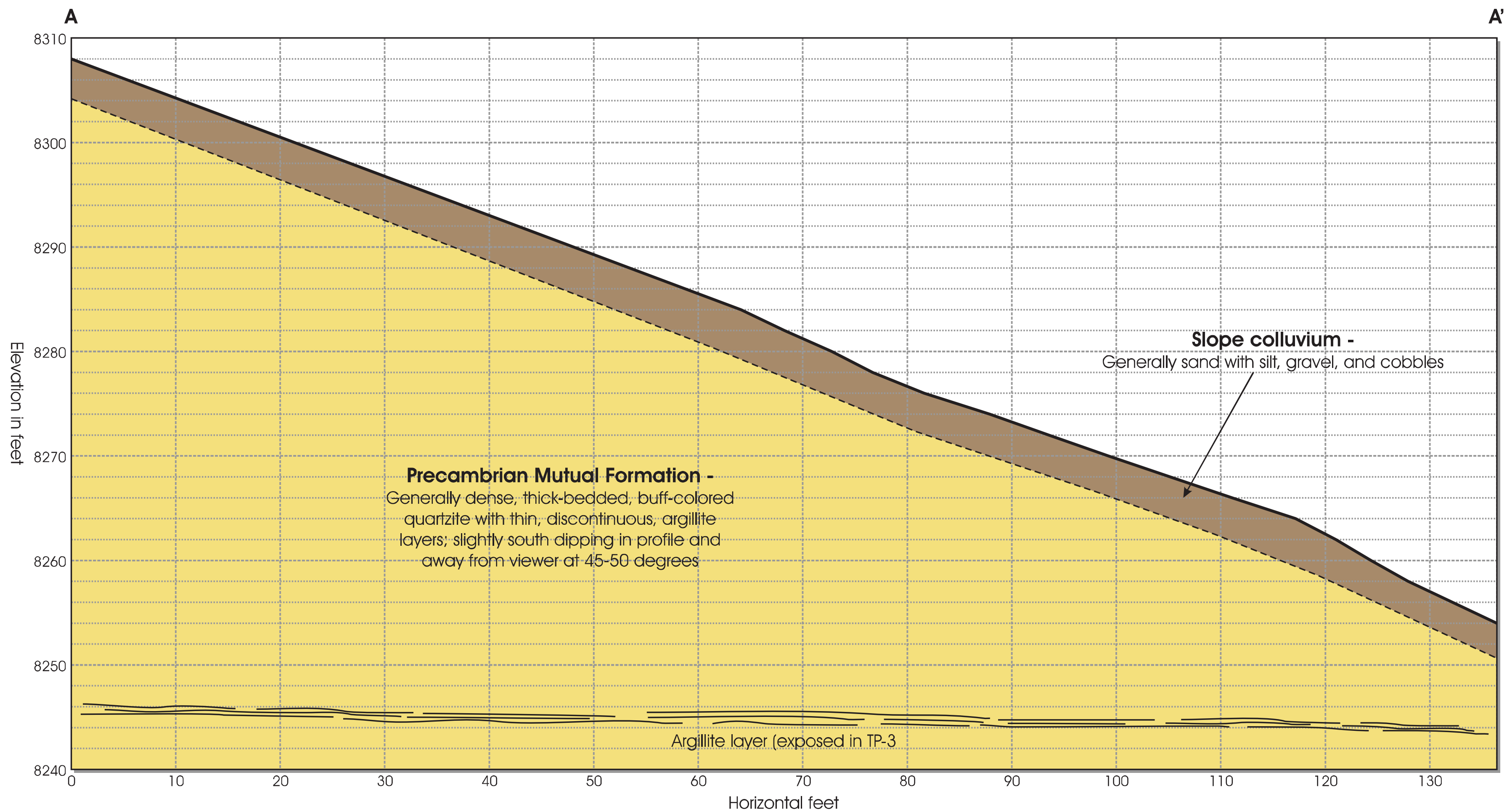
SCALE: 1 inch = 5 feet
(no vertical exaggeration)
East Wall Logged, North to South

Logged by Bill D. Black, P.G.
on July 1, 2016
Reviewed by
Craig V. Nelson, P.G.

**TEST PIT 3 LOG**

**GEOLOGIC HAZARDS EVALUATION**
Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 5C**




SCALE: 1 inch = 10 feet
No vertical exaggeration
Contacts based on subsurface data and are inferred in unexplored areas and at depth

WESTERN GEOLOGIC

## CROSS SECTION

**GEOLOGIC HAZARDS EVALUATION**
Powder Mountain West Lot 42-R
6706 Alpine Drive (6675 North)
Eden, Weber County, Utah

**FIGURE 6**