



July 29, 2019

KC Custom Homes  
2845 NE Marywood Ct  
Lee's Summit, MO 64086

Re: 1518 SW Blackstone Pl  
Lee's Summit, MO  
Lot 132 Napa Valley

Apex Engineers Inc. observed the house under construction at the above referenced address. For the purpose of this report, the house will be referred to as facing west. Our firm was asked to address a floor joist with a hole drilled for passage of plumbing in the second floor framing.

After computations, our firm recommends the following:

- Install a #2-2x10 header on each side of the hole, within 12" of the load bearing wall. See the attached marked-up plan for the location of structural members.
  - The #2-2x10 headers shall be connected to the adjacent existing #2-2x10 floor joists with Simpson Strong-Tie LUS28 face-mount joist hangers or equivalent connectors. Fasten joist hangers with (4) 10d common nails (0.148"x3") through the face and (6) 10d common nails (0.148"x3") through the sides.
  - Fasten the #2-2x10 floor joist with the drilled hole to the new #2-2x10 header with a Simpson-Strong-Tie LUS28 face-mount hanger. Fasten joist hangers with (4) 10d common nails (0.148"x3") through the face and (6) 10d common nails (0.148"x3") through the sides.
  - The new #2-2x10 header on the east side of the drilled hole may have a hole drilled through it, to allow the passage of plumbing. The maximum allowable hole diameter shall be 4.5". The minimum remaining depth of material above the drilled hole shall be 3.5".

Please call if our firm can be of further assistance. This report does not constitute approval by the enforcing jurisdiction.

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#### **LIMITATIONS**

The scope of our services includes only those items specifically addressed herein. All other items are outside the scope of this report; including any environmental assessment (such as, but not limited to mold, mildew, or presence of any other toxic substance or environmental risks).

In addition, the scope our services does not include any evaluation of the building or site for job-site safety and/or hazardous conditions. All construction shall be performed in compliance with IRC and OSHA standards at all times. Our firm has not been retained to examine the site or building for any of these conditions. In addition, the contractor shall retain sole responsibility for the quality of work, for adhering to plans, specifications, appropriate codes, and, for repairing defects, deficiencies or omission, regardless of when they are found. By the use of this report it is understood the above conditions are agreed to.



July 29, 2019  
1518 SW Blackstone Pl, Lee's Summit, MO  
2 of 2

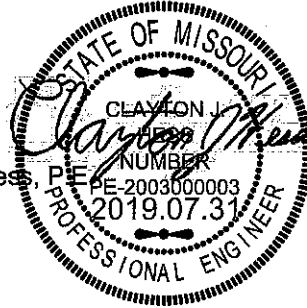
Please call if Apex Engineers, Inc. can be of further assistance.

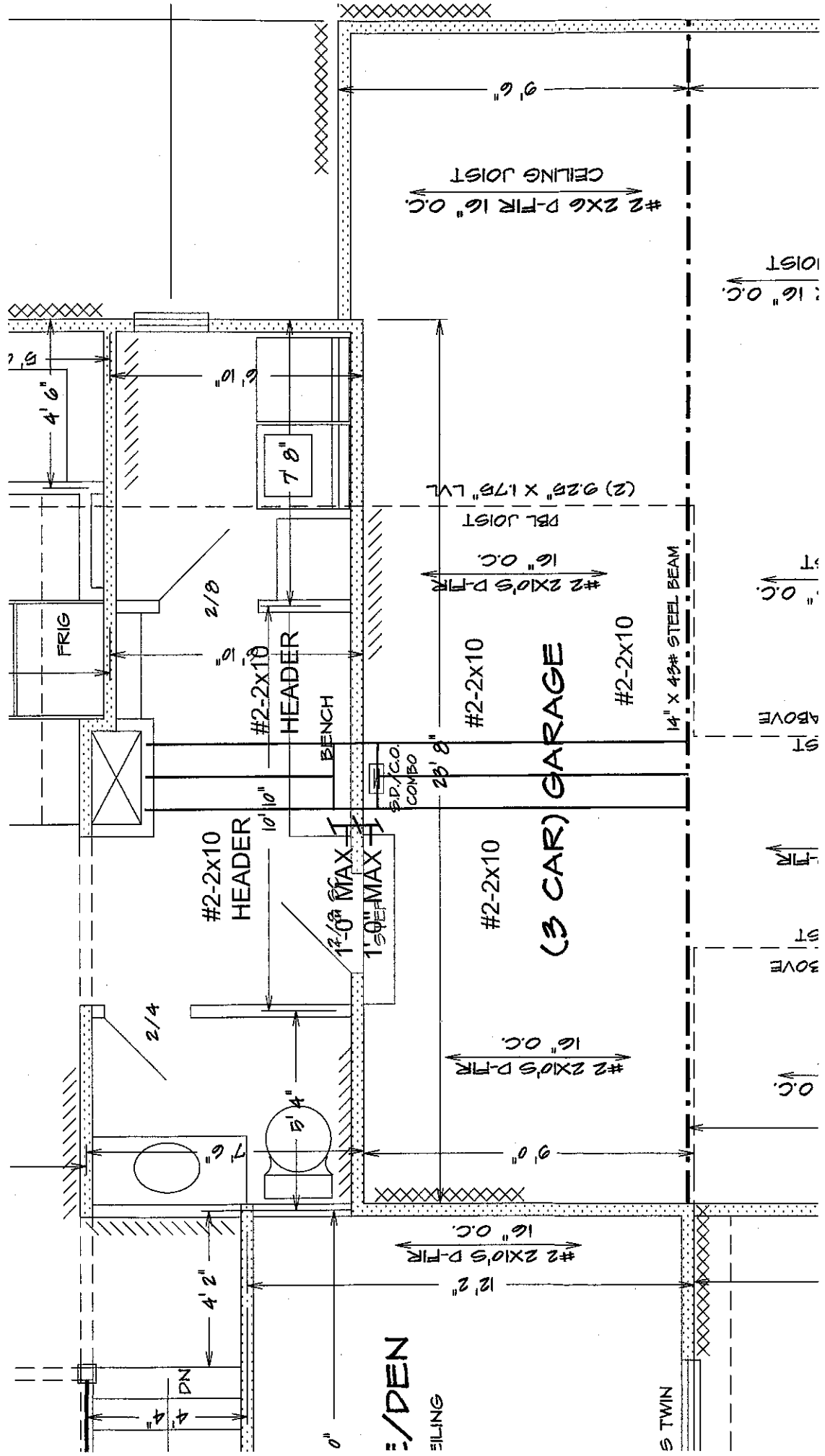
Best Regards,  
Apex Engineers, Inc.

A handwritten signature in cursive script that reads 'Joshua Jensen'.

Joshua Jensen, P.E.  
Project Engineer

Clayton J. Hess, P.E.  
Principal





## Wood Beam

.1518 SW Blackstone Place Lot 132 Napa Valley\_LSMO\2019.07.29\_Struct\_KC Custom Homes\beam calcs.ec6  
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Lic. #: KW-06005244

APEX ENGINEERS INC

**DESCRIPTION:** Floor Joists Adjacent to Notched Floor Joists

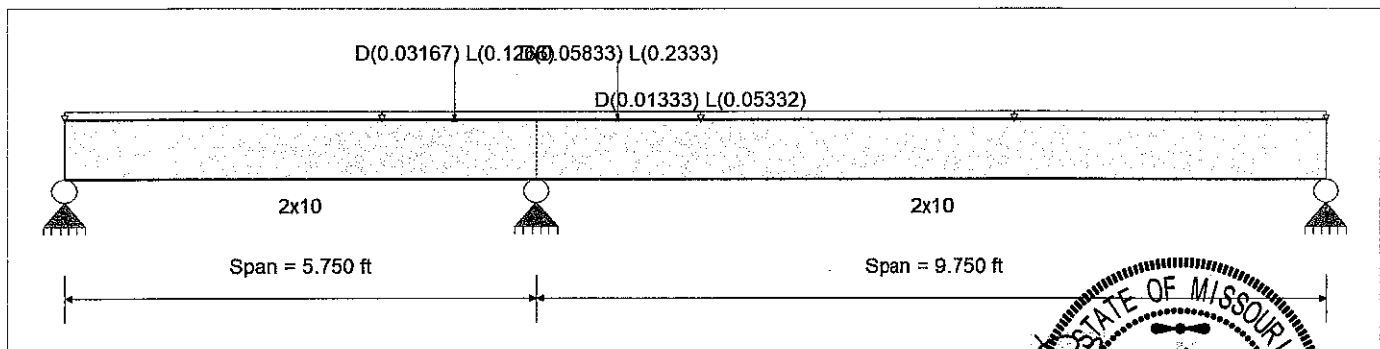
### CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-10

### Material Properties

|                                                                        |           |          |                           |           |
|------------------------------------------------------------------------|-----------|----------|---------------------------|-----------|
| Analysis Method : Allowable Stress Design                              | Fb +      | 900 psi  | E : Modulus of Elasticity |           |
| Load Combination ASCE 7-10                                             | Fb -      | 900 psi  | Ebend- xx                 | 1600 ksi  |
|                                                                        | Fc - Prll | 1350 psi | Eminbend - xx             | 580 ksi   |
| Wood Species : Douglas Fir - Larch                                     | Fc - Perp | 625 psi  |                           |           |
| Wood Grade : No.2                                                      | Fv        | 180 psi  |                           |           |
|                                                                        | Ft        | 575 psi  | Density                   | 31.21 pcf |
| Beam Bracing : Beam is Fully Braced against lateral-torsional buckling |           |          |                           |           |



### Applied Loads

Service loads entered. Load Factor

Loads on all spans...

Uniform Load on ALL spans : D = 0.010, L = 0.040 ksf, Tributary Width = 1.333 ft

Load for Span Number 1

Point Load : D = 0.03167, L = 0.1266 k @ 4.750 ft

Load for Span Number 2

Point Load : D = 0.05833, L = 0.2333 k @ 1.0 ft, (Point Load From Header)

### DESIGN SUMMARY

Design OK

|                                   |   |            |                      |                             |   |            |   |
|-----------------------------------|---|------------|----------------------|-----------------------------|---|------------|---|
| Maximum Bending Stress Ratio      | = | 0.454      | 1                    | Maximum Shear Stress Ratio  | = | 0.371      | 1 |
| Section used for this span        |   | 2x10       |                      | Section used for this span  |   | 2x10       |   |
| fb : Actual                       | = | 449.27 psi |                      | fv : Actual                 | = | 66.81 psi  |   |
| FB : Allowable                    | = | 990.00 psi |                      | Fv : Allowable              | = | 180.00 psi |   |
| Load Combination                  |   | +D+L+H     |                      | Load Combination            |   | +D+L+H     |   |
| Location of maximum on span       | = | 5.750 ft   |                      | Location of maximum on span | = | 5.750 ft   |   |
| Span # where maximum occurs       | = | Span # 1   |                      | Span # where maximum occurs | = | Span # 1   |   |
| Maximum Deflection                |   |            |                      |                             |   |            |   |
| Max Downward Transient Deflection |   | 0.042 in   | Ratio = 2758 >= 360  |                             |   |            |   |
| Max Upward Transient Deflection   |   | -0.004 in  | Ratio = 15396 >= 360 |                             |   |            |   |
| Max Downward Total Deflection     |   | 0.053 in   | Ratio = 2207 >= 240  |                             |   |            |   |
| Max Upward Total Deflection       |   | -0.006 in  | Ratio = 12317 >= 240 |                             |   |            |   |

### Maximum Forces & Stresses for Load Combinations

| Load Combination  | Segment Length | Span # | Max Stress Ratios |       |                |                  |                |                |                |                | Moment Values  |      |                | Shear Values    |      |                |                 |
|-------------------|----------------|--------|-------------------|-------|----------------|------------------|----------------|----------------|----------------|----------------|----------------|------|----------------|-----------------|------|----------------|-----------------|
|                   |                |        | M                 | V     | C <sub>d</sub> | C <sub>F/V</sub> | C <sub>i</sub> | C <sub>r</sub> | C <sub>m</sub> | C <sub>t</sub> | C <sub>L</sub> | M    | f <sub>b</sub> | F' <sub>b</sub> | V    | f <sub>v</sub> | F' <sub>v</sub> |
| +D+H              |                |        |                   |       |                |                  |                |                |                |                |                |      | 0.00           | 0.00            | 0.00 | 0.00           |                 |
| Length = 5.750 ft | 1              | 1      | 0.101             | 0.082 | 0.90           | 1.100            | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.16 | 89.86          | 891.00          | 0.12 | 13.36          | 162.00          |
| Length = 9.750 ft | 2              | 2      | 0.101             | 0.082 | 0.90           | 1.100            | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.16 | 89.86          | 891.00          | 0.12 | 13.36          | 162.00          |
| +D+L+H            |                |        |                   |       |                |                  |                |                |                |                |                |      |                | 0.00            | 0.00 | 0.00           |                 |
| Length = 5.750 ft | 1              | 1      | 0.454             | 0.371 | 1.00           | 1.100            | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.80 | 449.27         | 990.00          | 0.62 | 66.81          | 180.00          |
| Length = 9.750 ft | 2              | 2      | 0.454             | 0.371 | 1.00           | 1.100            | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.80 | 449.27         | 990.00          | 0.62 | 66.81          | 180.00          |

## Wood Beam

.1518 SW Blackstone Place\_Lot 132 Napa Valley\_LSMO\2019.07.29\_Struct\_KC Custom Homes\beam calcs.ec6  
Software copyright ENERCALC, INC. 1983-2019, Build:10.19.1.30

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APEX ENGINEERS INC

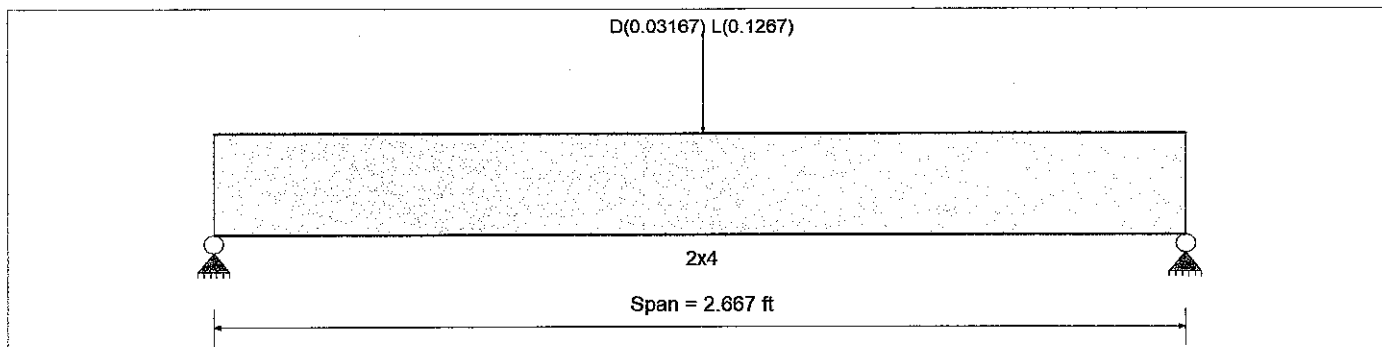
**DESCRIPTION:** Header With Hole Analyzed as 4" Deep

### CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10  
Load Combination Set : ASCE 7-10

### Material Properties

|                                                                        |           |          |                           |          |
|------------------------------------------------------------------------|-----------|----------|---------------------------|----------|
| Analysis Method : Allowable Stress Design                              | Fb +      | 900 psi  | E : Modulus of Elasticity |          |
| Load Combination ASCE 7-10                                             | Fb -      | 900 psi  | Ebend- xx                 | 1600ksi  |
|                                                                        | Fc - Pdl  | 1350 psi | Eminbend - xx             | 580ksi   |
| Wood Species : Douglas Fir - Larch                                     | Fc - Perp | 625 psi  |                           |          |
| Wood Grade : No.2                                                      | Fv        | 180 psi  |                           |          |
|                                                                        | Ft        | 575 psi  | Density                   | 31.21pcf |
| Beam Bracing : Beam is Fully Braced against lateral-torsional buckling |           |          |                           |          |



### Applied Loads

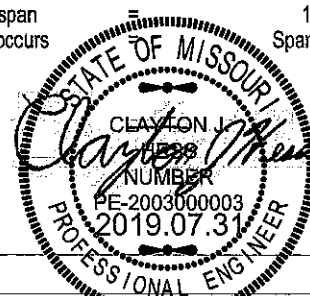
Service loads entered. Load Factors will be applied for calculations.

Point Load : D = 0.03167, L = 0.1267 k @ 1.333 ft

### DESIGN SUMMARY

Design OK

|                                   |   |             |                     |                             |   |            |   |
|-----------------------------------|---|-------------|---------------------|-----------------------------|---|------------|---|
| Maximum Bending Stress Ratio      | = | 0.306       | 1                   | Maximum Shear Stress Ratio  | = | 0.126      | 1 |
| Section used for this span        | = | 2x4         |                     | Section used for this span  | = | 2x4        |   |
| fb : Actual                       | = | 413.70psi   |                     | fv : Actual                 | = | 22.62 psi  |   |
| FB : Allowable                    | = | 1,350.00psi |                     | Fv : Allowable              | = | 180.00 psi |   |
| Load Combination                  | = | +D+L+H      |                     | Load Combination            | = | +D+L+H     |   |
| Location of maximum on span       | = | 1.333ft     |                     | Location of maximum on span | = | 1.343 ft   |   |
| Span # where maximum occurs       | = | Span # 1    |                     | Span # where maximum occurs | = | Span # 1   |   |
| Maximum Deflection                |   |             |                     |                             |   |            |   |
| Max Downward Transient Deflection |   | 0.010 in    | Ratio = 3155 >= 360 |                             |   |            |   |
| Max Upward Transient Deflection   |   | 0.000 in    | Ratio = 0 < 360     |                             |   |            |   |
| Max Downward Total Deflection     |   | 0.013 in    | Ratio = 2524 >= 240 |                             |   |            |   |
| Max Upward Total Deflection       |   | 0.000 in    | Ratio = 0 < 240     |                             |   |            |   |



### Maximum Forces & Stresses for Load Combinations

| Load Combination<br>Segment Length       | Span # | Max Stress Ratios |       |                |                 |                |                |                |                |                |      | Moment Values  |                |      | Shear Values   |                |  |
|------------------------------------------|--------|-------------------|-------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|------|----------------|----------------|------|----------------|----------------|--|
|                                          |        | M                 | V     | C <sub>d</sub> | C <sub>FV</sub> | C <sub>i</sub> | C <sub>r</sub> | C <sub>m</sub> | C <sub>t</sub> | C <sub>L</sub> | M    | f <sub>b</sub> | F <sub>b</sub> | V    | f <sub>v</sub> | F <sub>v</sub> |  |
| +D+H<br>Length = 2.667 ft                | 1      | 0.068             | 0.028 | 0.90           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.02 | 82.73          | 1215.00        | 0.00 | 0.00           | 0.00           |  |
| +D+L+H<br>Length = 2.667 ft              | 1      | 0.306             | 0.126 | 1.00           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.11 | 413.70         | 1350.00        | 0.00 | 0.00           | 0.00           |  |
| +D+Lr+H<br>Length = 2.667 ft             | 1      | 0.049             | 0.020 | 1.25           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.02 | 82.73          | 1687.50        | 0.00 | 0.00           | 0.00           |  |
| +D+S+H<br>Length = 2.667 ft              | 1      | 0.053             | 0.022 | 1.15           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.02 | 82.73          | 1552.50        | 0.00 | 0.00           | 0.00           |  |
| +D+0.750Lr+0.750L+H<br>Length = 2.667 ft | 1      | 0.196             | 0.080 | 1.25           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.08 | 330.96         | 1687.50        | 0.00 | 0.00           | 0.00           |  |
| +D+0.750L+0.750S+H<br>Length = 2.667 ft  | 1      | 0.213             | 0.087 | 1.15           | 1.500           | 1.00           | 1.00           | 1.00           | 1.00           | 1.00           | 0.08 | 330.96         | 1552.50        | 0.00 | 0.00           | 0.00           |  |