CG ENGINEERING

civil & structural
engineering & planning

# SUPPLEMENTAL STRUCTURAL CALCULATIONS

## Rudolf Residence

8253 W. Mercer Way
Mercer Island, WA


3/21/22

250 4th Ave S Ste 200
Edmonds, WA 98020
Phone: (425) 778-8500
Fax: (425) 778-5536

CG Project No.: 15227.10

**Project Location**
8253 W. Mercer Way
Mercer Island, WA

**Project Description**
These calculations are for construction/owner changes to the gravity and lateral systems. Calculations are only included for members that were revised. Refer to the original calculations dated 05/11/2018 for the full structural calculation package.

**Scope of Work**
Provide structural calculations and construction documents in accordance with current building code.

**Basis of Design**

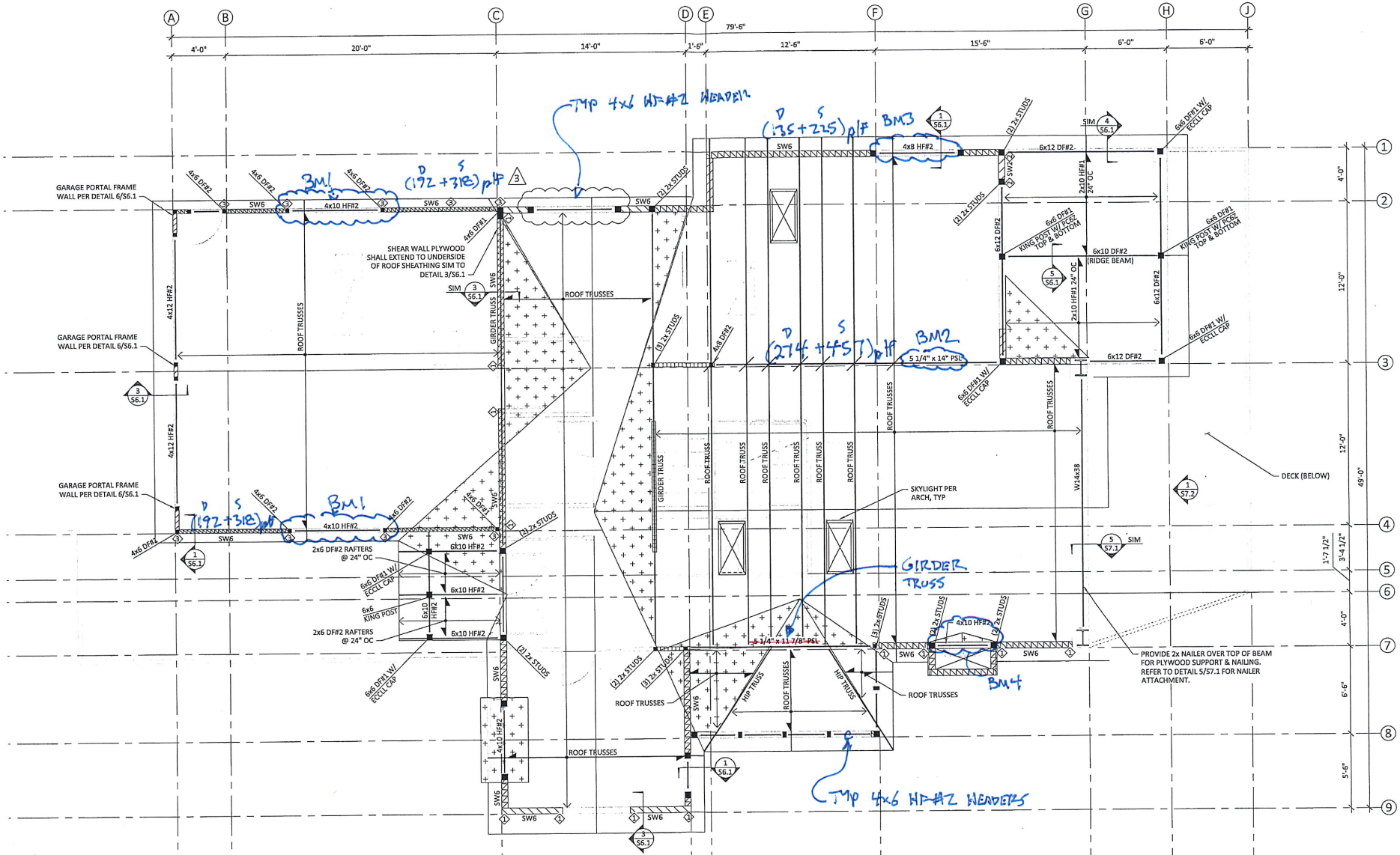
| | | |
|---|---|---|
| Roof Loads | Dead | 15 psf |
| | Snow | 25 psf |
| Floor Loads | Dead | 15 psf |
| | Garage | 55 psf |
| | Live | 40 psf |
| | Deck | 60 psf |

**Wind Parameters**
110 MPH Wind Speed, 3-Sec Gust
Exposure Category C
Kzt = 1.3

**Seismic Parameters**
Sds = 0.961
$I_E$ = 1.0
Light Wood Framed Shearwalls
R= 6.5

CG ENGINEERING
250 4th Ave South
Suite 200
Edmonds, WA 98020

| | | | |
|---|---|---|---|
| Description: Project Summary | | By: DTR | Date: 3/18/2022 |
| | | Checked | Date |
| | | Scale: NTS | Sheet No. |
| Project: Rudolf Res. | | Job No.: 15227.10 | 1 |

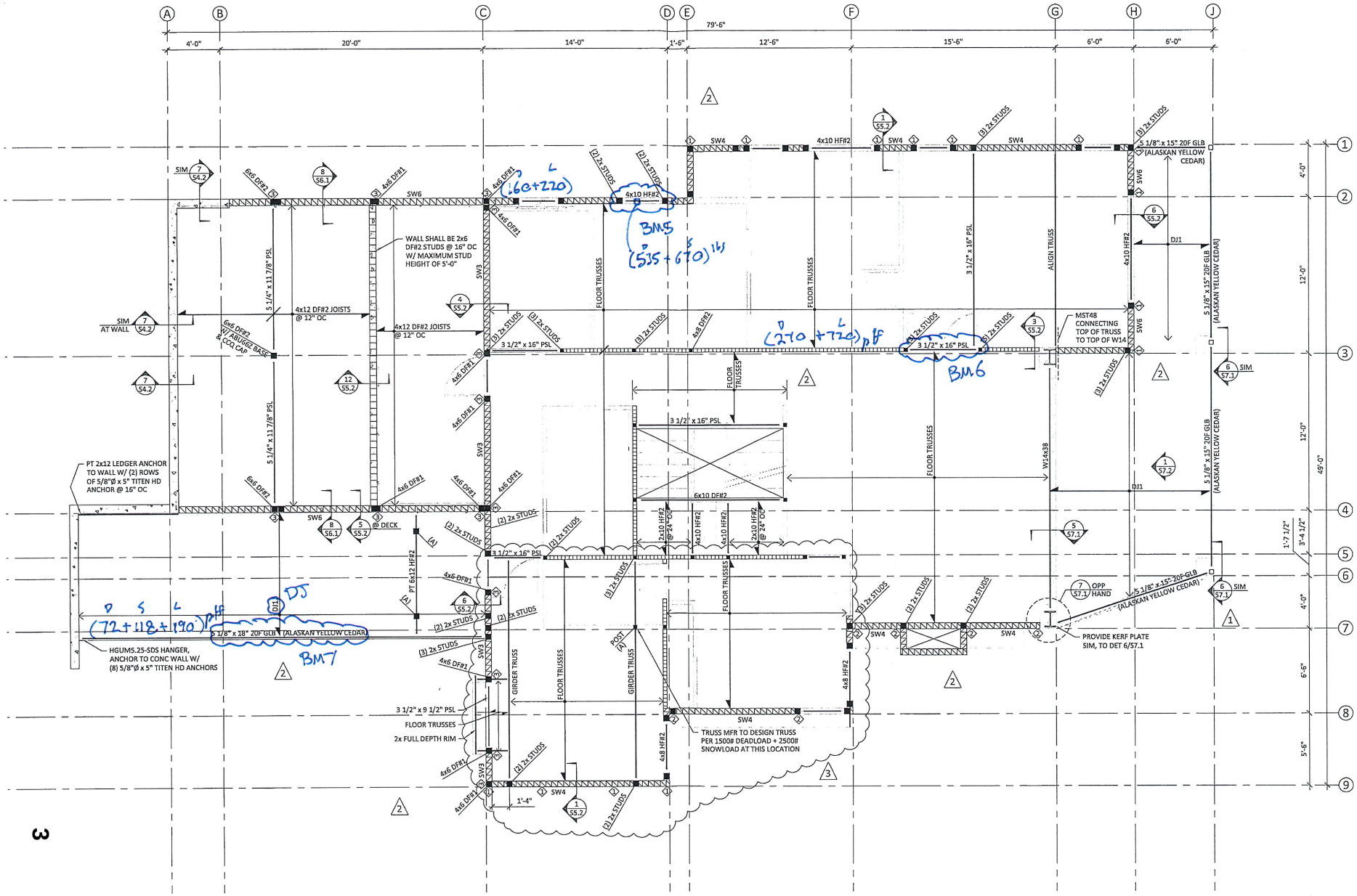



2

1 ROOF FRAMING PLAN & LOAD/BEAM KEY PLAN

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

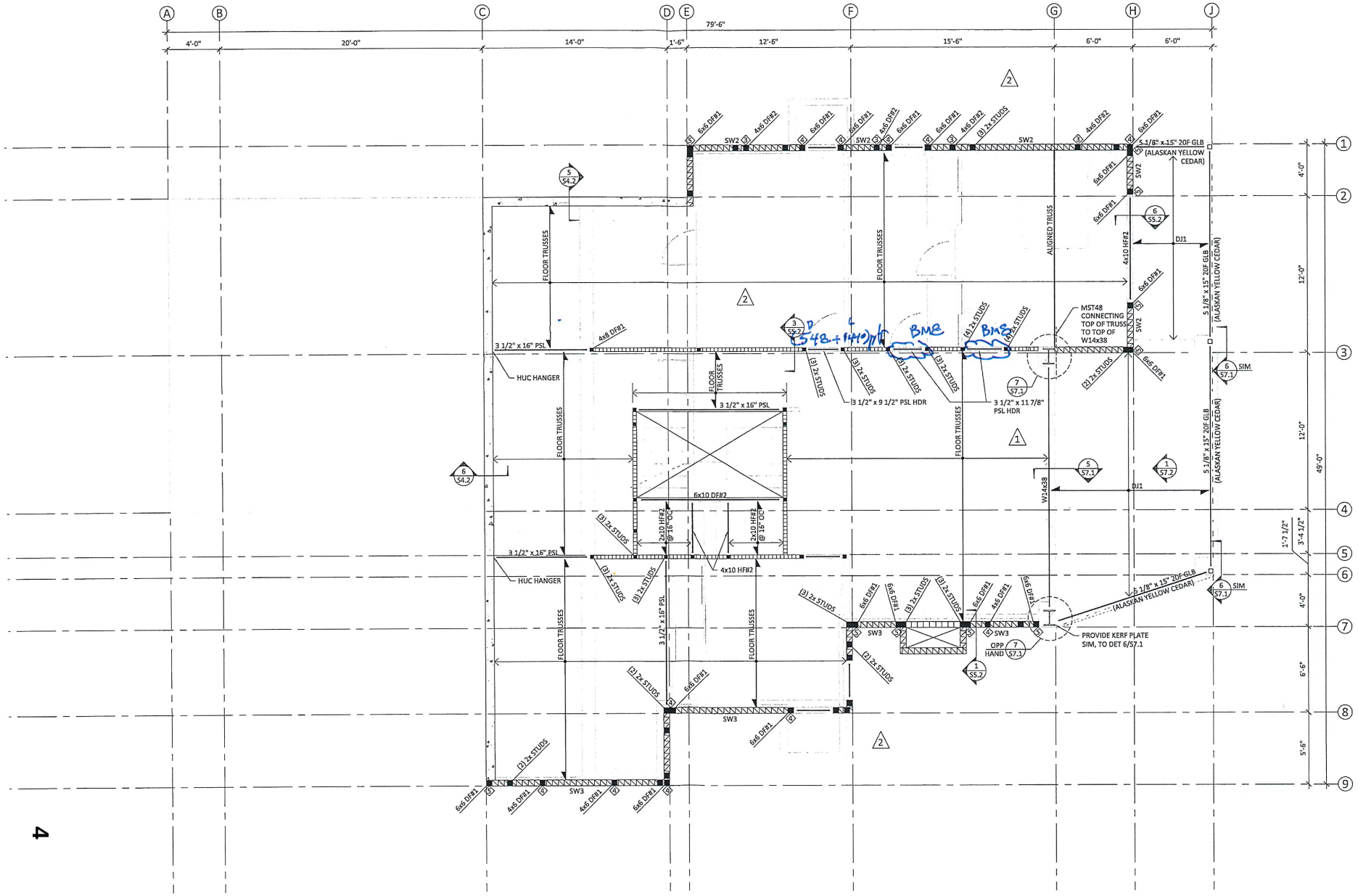
2'-0" 0 2'-0" 4'-0"




3

1 UPPER FLOOR FRAMING PLAN & LOAD/BEAM KEY PLAN
SCALE: 1/4" = 1'-0"

2'-0" 0 2'-0" 4'-0"




1 MAIN FLOOR FRAMING PLAN & LOAD/BEAM KEY PLAN

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

# Beam Span Table - Roof Beams

| Allowable Uniform Distributed Load in Pounds Per Lineal Foot (PLF) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Span Length in Feet | | | | | | | | | | | | | | | | |
| Beam | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 4x6 HF #2 | 937 | 600 | 417 | 306 | 234 | 185 | 150 | 124 | 104 | - | - | - | - | - | - | - | - |
| 3 1/2 x 5 1/2 LSL | 1541 | 986 | 685 | 503 | 369 | 259 | 189 | 142 | 109 | - | - | - | - | - | - | - | - |
| 4x8 HF #2 | 1461 | 1038 | 721 | 529 | 405 | 320 | 259 | 214 | 180 | 154 | 132 | 115 | 101 | - | - | - | - |
| 3 1/2 x 7 1/4 LSL | 2616 | 1674 | 1163 | 854 | 654 | 517 | 419 | 321 | 247 | 195 | 156 | 127 | 104 | - | - | - | - |
| 6x8 DF #2 | 2162 | 1384 | 961 | 706 | 541 | 427 | 346 | 286 | 240 | 205 | 176 | 154 | 135 | 120 | 107 | - | - |
| 2 11/16 x 9 1/4 PSL | 2405 | 1924 | 1603 | 1374 | 1193 | 942 | 763 | 631 | 530 | 452 | 378 | 307 | 253 | 211 | 178 | 151 | 130 |
| 4x10 HF #2 | 1863 | 1490 | 1084 | 796 | 610 | 482 | 390 | 322 | 271 | 231 | 199 | 173 | 152 | 135 | 120 | 108 | - |
| 3 1/2 x 9 1/4 PSL | 3600 | 2880 | 2400 | 2057 | 1785 | 1411 | 1143 | 944 | 789 | 620 | 497 | 404 | 333 | 277 | 234 | 199 | 170 |
| 5 1/4 x 9 1/4 PSL | 5399 | 4319 | 3600 | 3085 | 2677 | 2115 | 1713 | 1416 | 1183 | 931 | 745 | 606 | 499 | 416 | 351 | 298 | 256 |
| 2 11/16 x 9 1/2 PSL | 2470 | 1976 | 1647 | 1411 | 1235 | 991 | 802 | 663 | 557 | 475 | 409 | 334 | 275 | 229 | 193 | 164 | 141 |
| 3 1/2 x 9 1/2 LSL | 3634 | 2907 | 2423 | 1893 | 1449 | 1145 | 927 | 766 | 643 | 506 | 405 | 329 | 271 | 226 | 191 | 162 | 139 |
| 3 1/2 x 9 1/2 PSL | 3700 | 2960 | 2467 | 2114 | 1850 | 1482 | 1201 | 992 | 834 | 674 | 540 | 439 | 362 | 302 | 254 | 216 | 185 |
| 6x10 DF #2 | 3404 | 2219 | 1541 | 1132 | 867 | 685 | 555 | 458 | 385 | 328 | 283 | 247 | 217 | 192 | 171 | 154 | 139 |
| 5 1/4 x 9 1/2 PSL | 5545 | 4436 | 3697 | 3169 | 2773 | 2224 | 1802 | 1489 | 1251 | 1011 | 810 | 658 | 543 | 452 | 381 | 324 | 278 |
| 7 x 9 1/2 PSL | 7390 | 5912 | 4927 | 4223 | 3695 | 2966 | 2402 | 1985 | 1668 | 1349 | 1080 | 878 | 723 | 603 | 508 | 432 | 370 |
| 2 11/16 x 11 1/4 PSL | 2925 | 2340 | 1950 | 1671 | 1463 | 1300 | 1104 | 912 | 767 | 653 | 563 | 491 | 431 | 382 | 325 | 276 | 237 |
| 3 1/2 x 11 1/4 LSL | 4301 | 3441 | 2867 | 2458 | 2001 | 1581 | 1281 | 1058 | 889 | 758 | 653 | 547 | 450 | 375 | 316 | 269 | 231 |
| 3 1/2 x 11 1/4 PSL | 4382 | 3505 | 2921 | 2504 | 2191 | 1947 | 1653 | 1366 | 1148 | 978 | 843 | 729 | 600 | 501 | 422 | 359 | 307 |
| 6x12 DF #2 | 4123 | 3253 | 2259 | 1660 | 1271 | 1004 | 813 | 672 | 565 | 481 | 415 | 361 | 318 | 281 | 251 | 225 | 203 |
| 5 1/4 x 11 1/4 PSL | 6567 | 5253 | 4378 | 3752 | 3283 | 2918 | 2480 | 2050 | 1722 | 1468 | 1265 | 1097 | 904 | 754 | 635 | 540 | 463 |
| 2 11/16 x 11 7/8 PSL | 3085 | 2468 | 2057 | 1763 | 1543 | 1371 | 1222 | 1010 | 849 | 723 | 624 | 543 | 478 | 423 | 377 | 324 | 278 |
| 3 1/2 x 11 7/8 LSL | 4543 | 3634 | 3028 | 2596 | 2220 | 1754 | 1420 | 1174 | 986 | 841 | 725 | 631 | 530 | 441 | 372 | 316 | 271 |
| 3 1/2 x 11 7/8 PSL | 4623 | 3698 | 3082 | 2642 | 2312 | 2055 | 1831 | 1513 | 1271 | 1083 | 934 | 814 | 709 | 591 | 498 | 423 | 363 |
| 5 1/4 x 11 7/8 PSL | - | 5548 | 4623 | 3963 | 3467 | 3082 | 2747 | 2270 | 1908 | 1626 | 1402 | 1221 | 1063 | 887 | 747 | 635 | 544 |
| 7 x 11 7/8 PSL | - | - | 6160 | 5280 | 4620 | 4107 | 3663 | 3027 | 2543 | 2167 | 1869 | 1628 | 1411 | 1176 | 991 | 842 | 722 |

Notes:

1. This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)
2. Table values are based on the limiting beam shear & moment capacities, as well as deflection
3. The deflection limit used in the above table is (L/180 Total Load) and (L/240 Snow Load)
4. This table is applicable for $W_{LL}/W_{DL}$ <= 3.0
5. Table values include the Size Factor ($C_F$) and the Load Duration Factor ($C_D$)

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| | | | |
|---|---|---|---|
| Description: Beam Span Table | | By: DTR | Date: 03/05/18 |
| | | Checked | Date |
| | | Scale | Sheet No. |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

# Beam Span Table - Floor Beams

| Allowable Uniform Distributed Load in Pounds Per Lineal Foot (PLF) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Span Length in Feet | | | | | | | | | | | | | | | | |
| Beam | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 4x6 HF #2 | 815 | 522 | 362 | 266 | 204 | 160 | 117 | - | - | - | - | - | - | - | - | - | - |
| 3 1/2 x 5 1/2 LSL | 1340 | 858 | 546 | 344 | 230 | 162 | 118 | - | - | - | - | - | - | - | - | - | - |
| 4x8 HF #2 | 1270 | 902 | 627 | 460 | 353 | 279 | 226 | 186 | 155 | 122 | - | - | - | - | - | - | - |
| 3 1/2 x 7 1/4 LSL | 2275 | 1456 | 1011 | 743 | 522 | 367 | 267 | 201 | 155 | 122 | - | - | - | - | - | - | - |
| 6x8 DF #2 | 1880 | 1203 | 836 | 614 | 470 | 371 | 301 | 249 | 209 | 178 | 153 | 134 | 114 | - | - | - | - |
| 2 11/16 x 9 1/4 PSL | 2405 | 1924 | 1603 | 1374 | 1193 | 889 | 648 | 487 | 375 | 295 | 236 | 192 | 158 | 132 | 111 | - | - |
| 4x10 HF #2 | 1620 | 1296 | 942 | 692 | 530 | 419 | 339 | 280 | 236 | 201 | 173 | 151 | 133 | 113 | - | - | - |
| 3 1/2 x 9 1/4 PSL | 3130 | 2504 | 2087 | 1789 | 1553 | 1169 | 852 | 640 | 493 | 388 | 310 | 252 | 208 | 173 | 146 | 124 | 106 |
| 5 1/4 x 9 1/4 PSL | 4695 | 3756 | 3130 | 2683 | 2328 | 1753 | 1278 | 960 | 739 | 582 | 466 | 379 | 312 | 260 | 219 | 186 | 160 |
| 2 11/16 x 9 1/2 PSL | 2470 | 1976 | 1647 | 1411 | 1235 | 965 | 704 | 529 | 407 | 320 | 256 | 209 | 172 | 143 | 121 | 103 | - |
| 3 1/2 x 9 1/2 LSL | 3160 | 2528 | 2107 | 1646 | 1260 | 953 | 694 | 522 | 402 | 316 | 253 | 206 | 170 | 141 | 119 | 101 | - |
| 3 1/2 x 9 1/2 PSL | 3215 | 2572 | 2143 | 1837 | 1608 | 1270 | 926 | 696 | 536 | 421 | 337 | 274 | 226 | 188 | 159 | 135 | 116 |
| 6x10 DF #2 | 2960 | 1930 | 1340 | 984 | 754 | 596 | 482 | 399 | 335 | 285 | 246 | 214 | 188 | 167 | 149 | 134 | 118 |
| 5 1/4 x 9 1/2 PSL | 4825 | 3860 | 3217 | 2757 | 2413 | 1905 | 1389 | 1043 | 804 | 632 | 506 | 412 | 339 | 283 | 238 | 202 | 174 |
| 7 x 9 1/2 PSL | 6430 | 5144 | 4287 | 3674 | 3215 | 2540 | 1852 | 1391 | 1072 | 843 | 675 | 549 | 452 | 377 | 318 | 270 | 231 |
| 2 11/16 x 11 1/4 PSL | 2925 | 2340 | 1950 | 1671 | 1463 | 1300 | 1104 | 890 | 686 | 539 | 432 | 351 | 289 | 241 | 203 | 173 | 148 |
| 3 1/2 x 11 1/4 LSL | 3740 | 2992 | 2493 | 2137 | 1740 | 1375 | 1114 | 866 | 667 | 525 | 420 | 342 | 281 | 235 | 198 | 168 | 144 |
| 3 1/2 x 11 1/4 PSL | 3810 | 3048 | 2540 | 2177 | 1905 | 1693 | 1438 | 1155 | 889 | 700 | 560 | 455 | 375 | 313 | 264 | 224 | 192 |
| 6x12 DF #2 | 3585 | 2829 | 1964 | 1443 | 1105 | 873 | 707 | 584 | 491 | 418 | 361 | 314 | 276 | 245 | 218 | 196 | 177 |
| 5 1/4 x 11 1/4 PSL | 5710 | 4568 | 3807 | 3263 | 2855 | 2538 | 2157 | 1739 | 1340 | 1054 | 844 | 686 | 565 | 471 | 397 | 337 | 289 |
| 2 11/16 x 11 7/8 PSL | 3085 | 2468 | 2057 | 1763 | 1543 | 1371 | 1222 | 1010 | 804 | 632 | 506 | 412 | 339 | 283 | 238 | 202 | 174 |
| 3 1/2 x 11 7/8 LSL | 3950 | 3160 | 2633 | 2257 | 1930 | 1525 | 1235 | 1018 | 784 | 617 | 494 | 402 | 331 | 276 | 232 | 198 | 169 |
| 3 1/2 x 11 7/8 PSL | 4020 | 3216 | 2680 | 2297 | 2010 | 1787 | 1592 | 1316 | 1050 | 826 | 661 | 538 | 443 | 369 | 311 | 265 | 227 |
| 5 1/4 x 11 7/8 PSL | - | 4824 | 4020 | 3446 | 3015 | 2680 | 2389 | 1974 | 1575 | 1239 | 992 | 807 | 665 | 554 | 467 | 397 | 340 |
| 7 x 11 7/8 PSL | - | - | 5357 | 4591 | 4018 | 3571 | 3185 | 2632 | 2090 | 1644 | 1316 | 1070 | 882 | 735 | 619 | 526 | 451 |

Notes:

1. This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)
2. Table values are based on the limiting beam shear & moment capacities, as well as deflection
3. The deflection limit used in the above table is (L/240 Total Load) and (L/360 Live Load)
4. This table is applicable for $W_{LL}/W_{DL}$ <= 4.0
5. Table values include the Size Factor ($C_F$)


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Edmonds, WA 98020


| | | | |
|---|---|---|---|
| Description: Beam Span Table | | By: DTR | Date: 03/05/18 |
| | | Checked | Date |
| | | Scale | Sheet No. |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

## HF Column & HF Sill Plate Capacity TABLE

IBC 2015, NDS 2015

| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (2) 2x4 HF Stud | 5,149 | **4,121** | **3,311** | **2,693** | **2,224** | **1,862** | **1,579** | **1,355** | **1,175** | **1,028** | **906** |
| $P_{SILL}$ | **4,784** | - | - | - | - | - | - | - | - | - | - |
| (3) 2x4 HF Stud | 9,220 | 7,723 | **6,382** | **5,281** | **4,406** | **3,715** | **3,166** | **2,726** | **2,369** | **2,076** | **1,834** |
| $P_{SILL}$ | **6,910** | **6,910** | - | - | - | - | - | - | - | - | - |
| (4) 2x4 HF Stud | 12,294 | 10,298 | 8,510 | **7,041** | **5,875** | **4,953** | **4,221** | **3,635** | **3,159** | **2,769** | **2,445** |
| $P_{SILL}$ | **8,505** | **8,505** | **8,505** | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | |
| (2) 3x4 HF Stud | 10,245 | 8,581 | **7,091** | **5,868** | **4,896** | **4,128** | **3,518** | **3,029** | **2,632** | **2,307** | **2,038** |
| $P_{SILL}$ | **7,619** | **7,619** | - | - | - | - | - | - | - | - | - |
| (3) 3x4 HF Stud | 15,367 | 12,872 | 10,637 | **8,802** | **7,343** | **6,191** | **5,277** | **4,543** | **3,948** | **3,461** | **3,057** |
| $P_{SILL}$ | **10,631** | **10,631** | **10,631** | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | |
| (2) 2x6 HF Stud | 7,951 | **6,405** | **5,164** | **4,210** | **3,481** | **2,917** | **2,476** | **2,125** | **1,843** | **1,613** | **1,423** |
| $P_{SILL}$ | **7,518** | - | - | - | - | - | - | - | - | - | - |
| (3) 2x6 HF Stud | 16,730 | 15,297 | 13,636 | 11,927 | **10,333** | **8,934** | **7,746** | **6,750** | **5,918** | **5,221** | **4,634** |
| $P_{SILL}$ | **10,859** | **10,859** | **10,859** | **10,859** | - | - | - | - | - | - | - |
| (4) 2x6 HF Stud | 23,902 | 22,755 | 21,314 | 19,614 | 17,764 | 15,903 | 14,146 | **12,558** | **11,158** | **9,942** | **8,891** |
| $P_{SILL}$ | **13,365** | **13,365** | **13,365** | **13,365** | **13,365** | **13,365** | **13,365** | - | - | - | - |
| | | | | | | | | | | | |
| 4x6 HF #2 | 14,409 | 11,327 | 9,009 | **7,286** | **5,993** | **5,006** | **4,239** | **3,633** | **3,147** | **2,751** | **2,425** |
| $P_{SILL}$ | **8,328** | **8,328** | **8,328** | - | - | - | - | - | - | - | - |
| 4x8 HF #2 | 18,744 | 14,808 | 11,809 | **9,566** | **7,876** | **6,583** | **5,577** | **4,782** | **4,142** | **3,622** | **3,193** |
| $P_{SILL}$ | **10,277** | **10,277** | **10,277** | - | - | - | - | - | - | - | - |
| 4x10 HF #2 | 23,562 | 18,717 | 14,972 | **12,150** | **10,015** | **8,377** | **7,101** | **6,090** | **5,277** | **4,615** | **4,069** |
| $P_{SILL}$ | **13,112** | **13,112** | **13,112** | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | |
| 6x6 DF #2 | 19,595 | 18,889 | 17,995 | 16,908 | 15,659 | 14,315 | **12,960** | **11,665** | **10,475** | **9,407** | **8,463** |
| $P_{SILL}$ | **13,087** | **13,087** | **13,087** | **13,087** | **13,087** | **13,087** | - | - | - | - | - |
| 6x8 DF #2 | 25,830 | 24,899 | 23,721 | 22,288 | 20,642 | 18,870 | 17,083 | **15,377** | **13,808** | **12,400** | **11,156** |
| $P_{SILL}$ | **16,149** | **16,149** | **16,149** | **16,149** | **16,149** | **16,149** | **16,149** | - | - | - | - |
| 6x10 DF #2 | 28,621 | 27,790 | 26,739 | 25,450 | 23,929 | 22,224 | **20,420** | **18,614** | **16,885** | **15,285** | **13,835** |
| $P_{SILL}$ | **20,604** | **20,604** | **20,604** | **20,604** | **20,604** | **20,604** | - | - | - | - | - |

* columns designed per Column Table

| | | | | |
|---|---|---|---|---|
| CG ENGINEERING<br>250 4th Ave. South<br>Suite 200 | Description<br>Wood Column Capacity Table | | By DTR | Date 03/05/18 |
| | | | Checked | Date |
| | | | Scale | Sheet No. |
| | Project Rudolf Res. | | Job No. 15227.10 | |

## Beam #1

Span = 6'9"
Load = 192 + 318 = 510 plf
Reactions = 1720 lbs

Per Beam Table → 4x10 HF #2
Per Column Table → (2) 2x6 Studs

## Beam #2

Span = 21'-0"
Load = 274 + 457 plf
Reactions = 6204 lbs

Per woodworks → 5 1/4" x 14" PSL
Per column table → (3) 2x4 Studs

## Beam #3

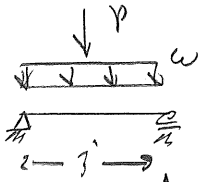
Span = 6'-0"
Load = 135 + 225 = 360
Reactions = 1080 lbs

Per Beam Span Table → 4x6 HF #2
Per Column Table → (2) 2x Studs

## Beam #4

See BM #1 calc.

## Beam #5




P = 535 + 670
w = 160 + 220

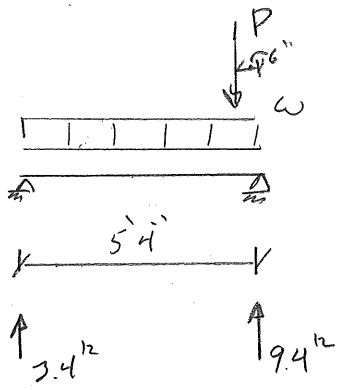
D S L
508 + 335 + 330
= 1000 lbs

Per woodworks → 4x10 HF #2

Per columns table → (2) 2x studs

| | | | |
|---|---|---|---|
| CG ENGINEERING<br>250 4th Ave. South<br>Suite 200<br>Edmonds, WA 98020<br>425.778.8500<br>www.cgengineering.com | Description Beam Calculations | By DTR | Date |
| | | Checked | Date |
| | | Scale | Sheet No. 8 |
| | Project Rudolf | Job No. 15227.10 | |

## BM #6




$w = (270_D + 720_L)$ plf

$P_1$ = BM2 Rxn = $(3246_D + 2959_S)$ lbs

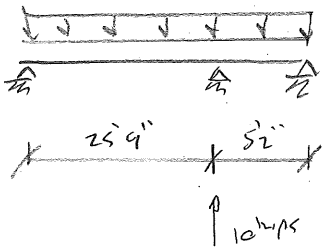
$P_2 = (690_D + 1156_S)$ lbs

Per woodworks → 3½" × 16" PSL

Per column table → 4×8 or (5) 2×4 studs

→ (3) 2×4 studs

## BM #7



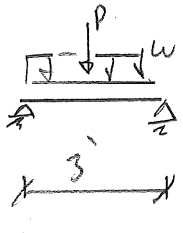

$w = (72_D + 118_S + 190_L)$ plf

Per woodworks → 5⅛" × 18" GLB

20F western red cedar

Per column table - 6×6 DF#2

## BM #8




P = BM6 Rxn = $(4719_D + 2208_L + 3953_S)$ lbs

$w = (548_D + 1440_L)$ plf

Per woodworks → 3½" × 11⅞" PSL

Per column table → (4) 2×4 studs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www.cgengineering.com


| | | | |
|---|---|---|---|
| Description Beam Calculations | | By DTR | Date |
| | | Checked | Date |
| | | Scale | Sheet No. 9 |
| Project Rudolf | | Job No. 15227.10 | |

| WoodWorks® SOFTWARE FOR WOOD DESIGN | COMPANY | PROJECT |
|---|---|---|
| | Mar. 18, 2022 15:48 | BM2 ~~NEW SPAN BIG ROOF BEAM~~ |

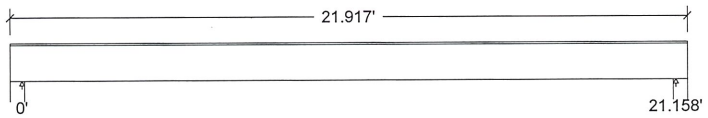
## Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| d | Dead | Full UDL | | | | 274.0 | | plf |
| s | Snow | Full UDL | | | | 270.0 | | plf |
| Self-weight | Dead | Full UDL | | | | 23.0 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 3246 | | 3246 |
| Snow | 2959 | | 2959 |
| Factored: | | | |
| Total | 6204 | | 6204 |
| Bearing: | | | |
| Capacity | | | |
| Beam | 18047 | | 18047 |
| Support | 23244 | | 23244 |
| Des ratio | | | |
| Beam | 0.34 | | 0.34 |
| Support | 0.27 | | 0.27 |
| Load comb | #2 | | #2 |
| Length | 5.50 | | 5.50 |
| Min req'd | 1.89 | | 1.89 |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |
| Cb support | - | | - |
| Fc sup | 700 | | 700 |

**BM1**

**PSL, 2.0E, 2.0E, 5-1/4"x14"**

Supports: All - Timber-soft Column, D.Fir-L No.2

Total length: 21.94'; Clear span: 21'; Volume = 11.2 cu.ft.

Lateral support: top = continuous, bottom = at supports;

**This section PASSES the design code check.**

### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 108 | Fv' = 334 | psi | fv/Fv' = 0.32 |
| Bending(+) | fb = 2220 | Fb' = 3278 | psi | fb/Fb' = 0.68 |
| Live Defl'n | 0.51 = L/500 | 1.06 = L/240 | in | 0.48 |
| Total Defl'n | 1.06 = L/238 | 1.41 = L/180 | in | 0.75 |





### Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Ci | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 290 | 1.15 | - | 1.00 | - | - | - | - | 1.00 | - | 2 |
| Fb'+ | 2900 | 1.15 | - | 1.00 | 1.000 | 0.983 | - | 1.00 | 1.00 | - | 2 |
| Fcp' | 625 | - | - | 1.00 | - | - | - | - | 1.00 | - | - |
| E' | 2.0 million | | - | 1.00 | - | - | - | - | 1.00 | - | 2 |
| Eminy' | 1.04 million | | - | 1.00 | - | - | - | - | 1.00 | - | 2 |

CRITICAL LOAD COMBINATIONS:

```
Shear      : LC #2  = D + S
Bending(+): LC #2  = D + S
Deflection: LC #2  = D + S  (live)
            LC #2  = D + S  (total)
Bearing    : Support 1 - LC #2 = D + S
             Support 2 - LC #2 = D + S
D=dead S=snow
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1
```

CALCULATIONS:

```
V max = 5998, V design = 5292 lbs; M(+) = 31725 lbs-ft
  EIy = 2401.00 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.0 dead + "live"
```

### Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

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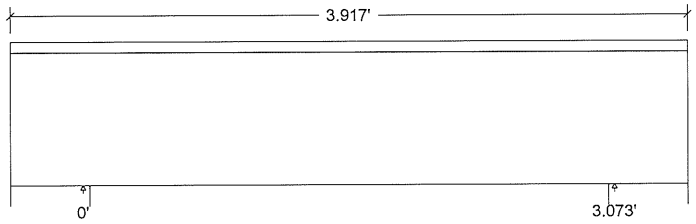
## Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| d | Dead | Full UDL | | | | 220.0 | | plf |
| s | Live | Full UDL | | | | 270.0 | | plf |
| Load3 | Dead | Point | | 1.50 | | 535 | | lbs |
| Load4 | Snow | Point | | 1.50 | | 670 | | lbs |
| Self-weight | Dead | Full UDL | | | | 6.7 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 788 | | 630 |
| Live | 528 | | 529 |
| Snow | 434 | | 236 |
| Factored: | | | |
| Total | 1510 | | 1203 |
| Bearing: | | | |
| Capacity | | | |
| Beam | 7796 | | 7796 |
| Support | 14822 | | 14822 |
| Des ratio | | | |
| Beam | 0.17 | | 0.15 |
| Support | 0.09 | | 0.08 |
| Load comb | #3 | | #3 |
| Length | 5.50 | | 5.50 |
| Min req'd | 0.93 | | 0.82 |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |
| Cb support | - | | - |
| Fc sup | 700 | | 700 |





## BM1

**Lumber-soft, Hem-Fir, No.2, 4x10 (3-1/2"x9-1/4")**

Supports: All - Timber-soft Column, D.Fir-L No.2
Total length: 3.94'; Clear span: 3.0'; Volume = 0.9 cu.ft.
Lateral support: top = continuous, bottom = at supports;
**This section PASSES the design code check.**

### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 46 | Fv' = 172 | psi | fv/Fv' = 0.26 |
| Bending(+) | fb = 286 | Fb' = 1173 | psi | fb/Fb' = 0.24 |
| Live Defl'n | 0.00 = < L/999 | 0.15 = L/240 | in | 0.02 |
| Total Defl'n | 0.01 = < L/999 | 0.20 = L/180 | in | 0.03 |

### Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CF | Cfu | Cr | Cfrt | Ci | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 150 | 1.15 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 3 |
| Fb'+ | 850 | 1.15 | 1.00 | 1.00 | 1.000 | 1.200 | - | 1.00 | 1.00 | 1.00 | 3 |
| Fcp' | 405 | - | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | - |
| E' | 1.3 million | | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 3 |
| Emin' | 0.47 million | | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 3 |

CRITICAL LOAD COMBINATIONS:
Shear : LC #3 = D + 0.75(L + S)
Bending(+): LC #3 = D + 0.75(L + S)
Deflection: LC #3 = D + 0.75(L + S) (live)
LC #3 = D + 0.75(L + S) (total)
Bearing : Support 1 - LC #3 = D + 0.75(L + S)
Support 2 - LC #3 = D + 0.75(L + S)
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1
CALCULATIONS:
V max = 1332, V design = 985 lbs; M(+) = 1189 lbs-ft
EIy = 300.09 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.0 dead + "live"

### Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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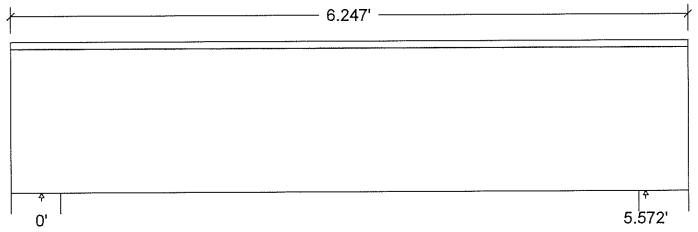
## Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| Load1 | Dead | Full UDL | | | | 270.0 | | plf |
| Load2 | Live | Full UDL | | | | 720.0 | | plf |
| Load3 | Dead | Point | | 0.50 | | 4000 | | lbs |
| Load4 | Snow | Point | | 0.50 | | 4115 | | lbs |
| Self-weight | Dead | Full UDL | | | | 17.5 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 4719 | | 1065 |
| Live | 2208 | | 2290 |
| Snow | 3953 | | 162 |
| Factored: | | | |
| Total | 9340 | | 3355 |
| Bearing: | | | |
| Capacity | | | |
| Beam | 12031 | | 12031 |
| Support | 17046 | | 14822 |
| Des ratio | | | |
| Beam | 0.78 | | 0.28 |
| Support | 0.55 | | 0.23 |
| Load comb | #3 | | #2 |
| Length | 5.50 | | 5.50 |
| Min req'd | 4.27 | | 1.53 |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |
| Cb support | - | | - |
| Fc sup | 700 | | 700 |





## BM1

**PSL, 2.0E, 2.0E, 3-1/2"x16"**

Supports: All - Timber-soft Column, D.Fir-L No.2
Total length: 6.25'; Clear span: 5.313'; Volume = 2.4 cu.ft.
Lateral support: top = continuous, bottom = at supports;
**This section PASSES the design code check.**

### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv* = 38 | Fv' = 290 | psi | fv*/Fv' = 0.13 |
| Bending(+) | fb = 350 | Fb' = 2810 | psi | fb/Fb' = 0.12 |
| Live Defl'n | 0.01 = < L/999 | 0.19 = L/360 | in | 0.04 |
| Total Defl'n | 0.01 = < L/999 | 0.28 = L/240 | in | 0.04 |

*The effect of point loads within a distance d of the support has been included as per NDS 3.4.3.1

### Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Ci | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 290 | 1.00 | - | 1.00 | - | - | - | - | 1.00 | - | 2 |
| Fb'+ | 2900 | 1.00 | - | 1.00 | 1.000 | 0.969 | - | 1.00 | 1.00 | - | 2 |
| Fcp' | 625 | - | - | 1.00 | - | - | - | - | 1.00 | - | - |
| E' | 2.0 million | | - | 1.00 | - | - | - | - | 1.00 | - | 2 |
| Eminy' | 1.04 million | | - | 1.00 | - | - | - | - | 1.00 | - | 2 |

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 - LC #3 = D + 0.75(L + S)
Support 2 - LC #2 = D + L
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1
CALCULATIONS:
V max = 6649, V design* = 1434 lbs; M(+) = 4361 lbs-ft
EIy = 2389.33 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.0 dead + "live"

### Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

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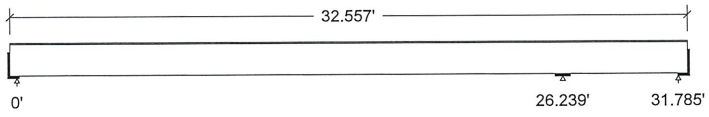
## Design Check Calculation Sheet
WoodWorks Sizer 2019 (Update 4)

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| Load1 | Dead | Full UDL | No | | | 72.0 | | plf |
| Load2 | Live | Full UDL | No | | | 190.0 | | plf |
| Load3 | Snow | Full UDL | No | | | 118.0 | | plf |
| Self-weight | Dead | Full UDL | No | | | 17.6 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | | | |
|---|---|---|---|---|---|
| Unfactored: | | | | | |
| Dead | 954 | | 2827 | | -878 |
| Live | 2037 | | 5996 | | -1847 |
| Snow | 1265 | | 3724 | | -1147 |
| Factored: | | | | | |
| Uplift | | | | | -3124 |
| Total | 3431 | | 10116 | | |
| Bearing: | | | | | |
| Capacity | | | | | |
| Beam | 6349 | | 10116 | | 6349 |
| Des ratio | | | | | |
| Beam | 0.54 | | 1.00 | | 0.00 |
| Load comb | #3 | | #3 | | #1 |
| Length | 5.50 | | 8.76 | | 5.50 |
| Min req'd | 2.97 | | 8.76 | | 0.50* |
| Cb | 1.00 | | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 | | 1.00 |

*Minimum bearing length setting used: 1/2" for end supports

### BM&
**Glulam-Balanced, West Species, 20F-1.5E WS, 5-1/8"x18"**
Supports: All - Hanger
Total length: 32.56'; Clear span: 25.75', 5.188'; Volume = 20.9 cu.ft.; 12 laminations, 5-1/8" maximum width,
Wet service; Lateral support: top = continuous, bottom = at end supports;
**This section PASSES the design code check.**

### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 64 | Fv' = 171 | psi | fv/Fv' = 0.38 |
| Bending(+) | fb = 654 | Fb' = 1538 | psi | fb/Fb' = 0.43 |
| Bending(-) | fb = 997 | Fb' = 1198 | psi | fb/Fb' = 0.83 |
| Live Defl'n | 0.40 = L/782 | 0.87 = L/360 | in | 0.46 |
| Total Defl'n | 0.56 = L/563 | 1.31 = L/240 | in | 0.43 |





### Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Notes | Cvr | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 195 | 1.00 | 0.88 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 | 2 |
| Fb'+ | 2000 | 1.00 | 0.80 | 1.00 | 1.000 | 0.961 | - | - | 1.00 | 1.00 | - | 2 |
| Fb'- | 2000 | 1.15 | 0.80 | 1.00 | 0.651 | 1.000 | - | - | 1.00 | 1.00 | - | 3 |
| Fcp' | 425 | - | 0.53 | 1.00 | - | - | - | - | 1.00 | - | - | - |
| E' | 1.5 million | | 0.83 | 1.00 | - | - | - | - | 1.00 | - | - | 3 |
| Eminy' | 0.63 million | | 0.83 | 1.00 | - | - | - | - | 1.00 | - | - | 3 |

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Bending(-): LC #3 = D + 0.75(L + S)
Deflection: LC #3 = D + 0.75(L + S) (live)
LC #3 = D + 0.75(L + S) (total)
Bearing : Support 1 - LC #3 = D + 0.75(L + S)
Support 2 - LC #3 = D + 0.75(L + S)
Support 3 - LC #1 = D only
Support 3 - LC #3 = D + 0.75(L + S)
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1
CALCULATIONS:
V max = 4391, V design = 3951 lbs; M(+) = 15080 lbs-ft; M(-) = 22990 lbs-ft
EIy = 3736.07 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.0 dead + "live"
Lateral stability(-): Lu = 31.81' Le = 58.50' RB = 21.9; Lu based on full span

### Design Notes:
1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

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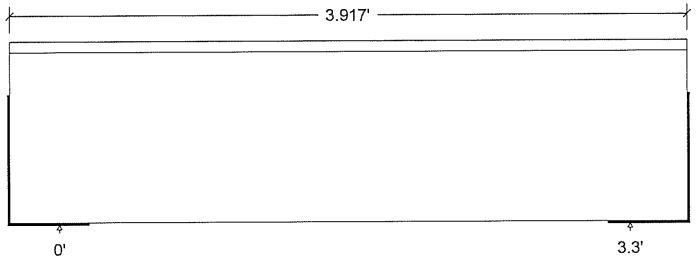
## Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| Load1 | Dead | Full UDL | | | | 548.0 | | plf |
| Load2 | Live | Full UDL | | | | 1440.0 | | plf |
| Load3 | Dead | Point | | 1.50 | | 4719 | | lbs |
| Load4 | Live | Point | | 1.50 | | 2208 | | lbs |
| Load5 | Snow | Point | | 1.50 | | 3953 | | lbs |
| Self-weight | Dead | Full UDL | | | | 13.0 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 4063 | | 2845 |
| Live | 4181 | | 3667 |
| Snow | 2497 | | 1456 |
| Factored: | | | |
| Total | 9071 | | 6687 |
| Bearing: | | | |
| Capacity | | | |
| Beam | 12031 | | 12031 |
| Des ratio | | | |
| Beam | 0.75 | | 0.56 |
| Load comb | #3 | | #3 |
| Length | 5.50 | | 5.50 |
| Min req'd | 4.15 | | 3.06 |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |

**BM8**

**PSL, 2.0E, 2.0E, 3-1/2"x11-7/8"**

Supports: All - Hanger

Total length: 3.94'; Clear span: 3'; Volume = 1.1 cu.ft.

Lateral support: top = continuous, bottom = at supports;

**This section PASSES the design code check.**





### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 243 | Fv' = 334 | psi | fv/Fv' = 0.73 |
| Bending(+) | fb = 1349 | Fb' = 3338 | psi | fb/Fb' = 0.40 |
| Live Defl'n | 0.01 = < L/999 | 0.11 = L/360 | in | 0.08 |
| Total Defl'n | 0.02 = < L/999 | 0.17 = L/240 | in | 0.10 |

### Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Ci | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 290 | 1.15 | - | 1.00 | - | - | - | - | 1.00 | - | 3 |
| Fb'+ | 2900 | 1.15 | - | 1.00 | 1.000 | 1.001 | - | 1.00 | 1.00 | - | 3 |
| Fcp' | 625 | - | - | 1.00 | - | - | - | - | 1.00 | - | - |
| E' | 2.0 million | | - | 1.00 | - | - | - | - | 1.00 | - | 3 |
| Eminy' | 1.04 million | | - | 1.00 | - | - | - | - | 1.00 | - | 3 |

CRITICAL LOAD COMBINATIONS:

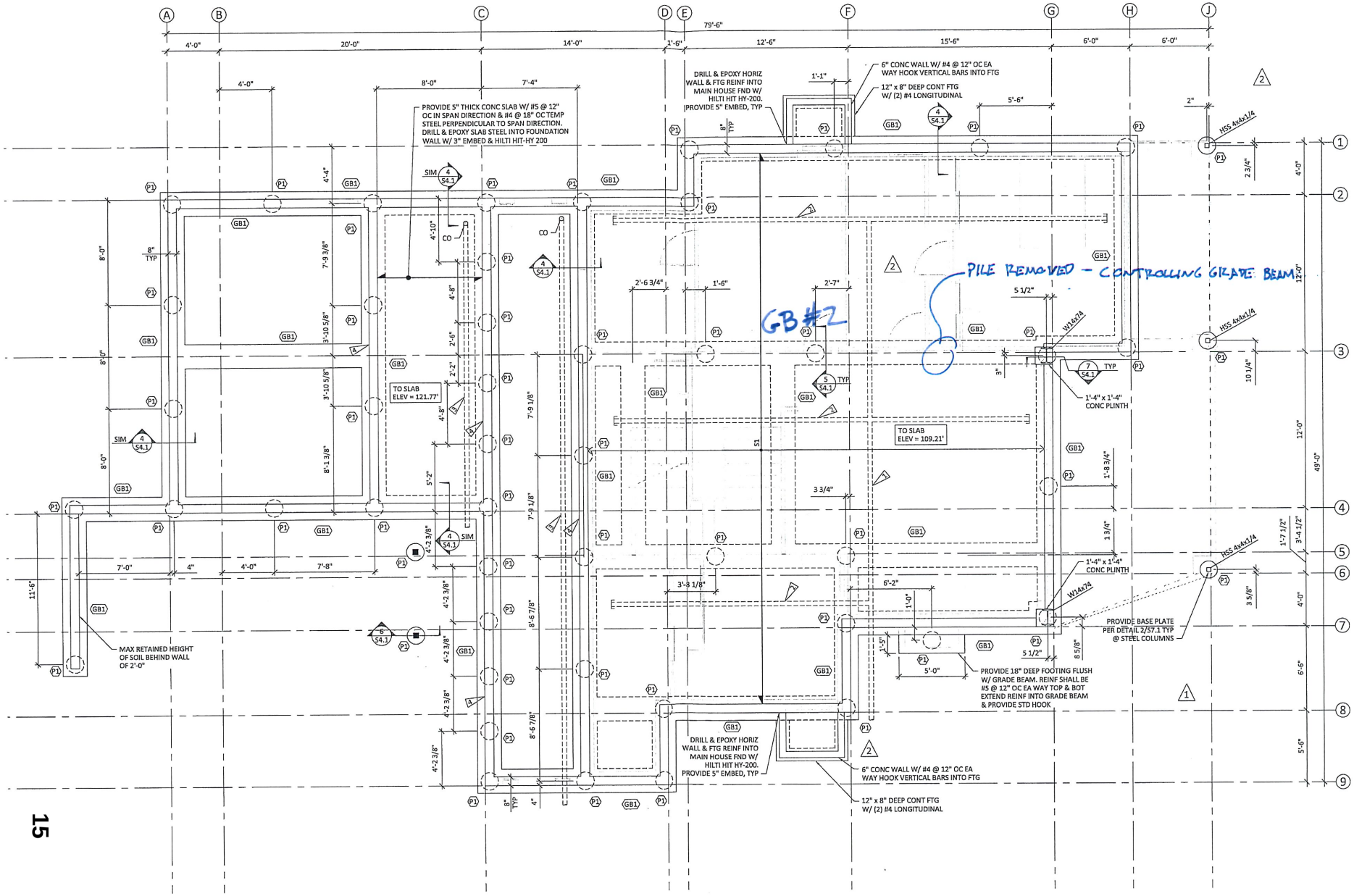
```
Shear      : LC #3  = D + 0.75(L + S)
Bending(+): LC #3  = D + 0.75(L + S)
Deflection: LC #3  = D + 0.75(L + S)  (live)
            LC #3  = D + 0.75(L + S)  (total)
Bearing    : Support 1 - LC #3 = D + 0.75(L + S)
             Support 2 - LC #3 = D + 0.75(L + S)
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1
```

CALCULATIONS:

```
V max = 8608, V design = 6726 lbs; M(+) = 9250 lbs-ft
  EIy = 976.83 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.0 dead + "live"
```

### Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.




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

2'-0" 0 2'-0" 4'-0"

Project Title:
Engineer:
Project ID:
Project Descr:

# Concrete Beam

Project File: grade beams (NEW).ec6



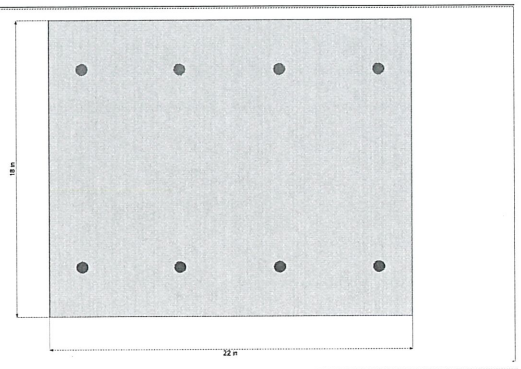
**DESCRIPTION:** Grade Beam #2 (revsied without pile)

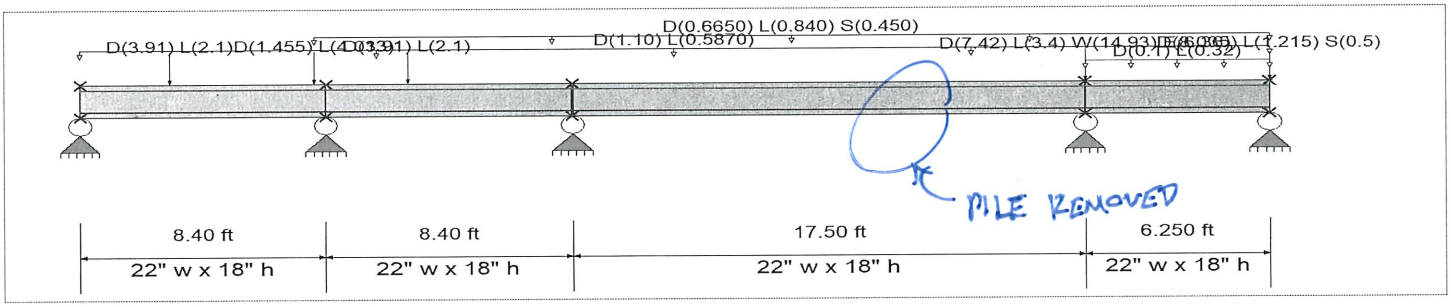
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : ASCE 7-10

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = 4.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = 474.342 psi | | Shear : | 0.750 |
| $\psi$ Density | = 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = 1.0 | | | |
| Elastic Modulus | = 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = 29,000.0 ksi | Stirrup Bar Size # | | 3 |
| | | Number of Resisting Legs Per Stirrup | = | 2 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 22.0 in, Height = 18.0 in

Span #1 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 8.40 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 8.40 ft in this span

Span #2 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 8.40 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 8.40 ft in this span

Span #3 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 17.50 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 17.50 ft in this span

Span #4 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 6.250 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 6.250 ft in this span

**Beam self weight calculated and added to loads**
**Loads on all spans...**
D = 1.10, L = 0.5870

Uniform Load on ALL spans : D = 1.10, L = 0.5870 k/ft

Partial Length Uniform Load : D = 0.6650, L = 0.840, S = 0.450 k/ft, Extent = 8.0 -->> 40.550 ft

**Load for Span Number 1**
Point Load : D = 1.455, L = 4.013 k @ 8.0 ft

Point Load : D = 3.910, L = 2.10 k @ 3.080 ft

**Load for Span Number 2**
Point Load : D = 3.910, L = 2.10 k @ 2.80 ft

**Load for Span Number 4**
Point Load : D = 7.420, L = 3.40, W = 14.930, E = 6.360 k @ 0.0 ft

Point Load : D = 8.035, L = 1.215, S = 0.50 k @ 6.250 ft

Uniform Load : D = 0.10, L = 0.320 k/ft, Tributary Width = 1.0 ft

Project Title:
Engineer:
Project ID:
Project Descr:

# Concrete Beam

Project File: grade beams (NEW).ec6

LIC# : KW-06015244, Build:20.22.2.9 CG ENGINEERING (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grade Beam #2 (revsied without pile)

## *DESIGN SUMMARY*

OKAY

Check As Min Limits!

| | | |
|---|---|---|
| Maximum Bending Stress Ratio = | 0.947 | : 1 |
| Section used for this span | Typical Section | |
| Mu : Applied | -111.215 | k-ft |
| Mn * Phi : Allowable | 117.418 | k-ft |
| Location of maximum on span | 0.000 | ft |
| Span # where maximum occurs | Span # 4 | |

Maximum Deflection

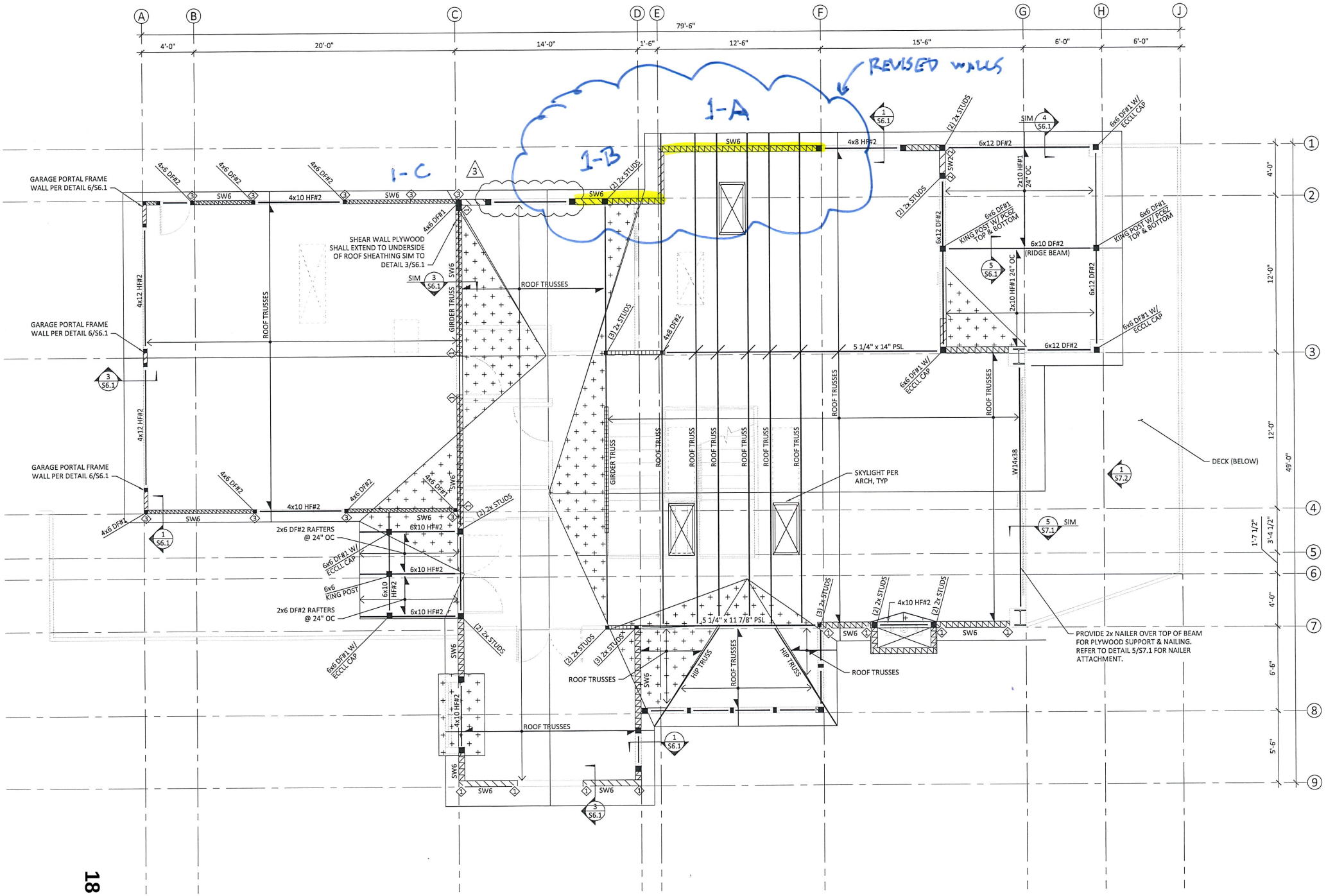
| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.029 in | Ratio = | 7261 | >=360.0 | Span: 4 : L Only |
| Max Upward Transient Deflection | -0.002 in | Ratio = | 32068 | >=360.0 | Span: 4 : W Only |
| Max Downward Total Deflection | 0.119 in | Ratio = | 1758 | >=180.0 | Span: 4 : +D+L |
| Max Upward Total Deflection | -0.007 in | Ratio = | 11008 | >=180.0 | Span: 4 : +D+0.750L+0.750S |

## Shear Stirrup Requirements

Between 0.00 to 7.96 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 8.05 to 8.31 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 7.000 in
Between 8.40 to 13.17 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 13.26 to 22.51 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 7.000 in
Between 22.69 to 28.41 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in
Between 28.59 to 37.66 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 7.000 in
Between 37.72 to 40.48 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use #3 stirrups spaced at 0.000 in

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft | Load Combination | Max. "+" Defl (in) | Location in Span (ft |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.0075 | 3.758 | +D+L | -0.0004 | 8.621 |
| +D+L | 2 | 0.0062 | 8.861 | +D+L | -0.0076 | 5.968 |
| +D+L | 3 | 0.1194 | 8.750 | +D+L | -0.0014 | 17.664 |
| +D+L | 4 | 0.0000 | 6.250 | +D+0.750L+0.750S | -0.0068 | 2.138 |

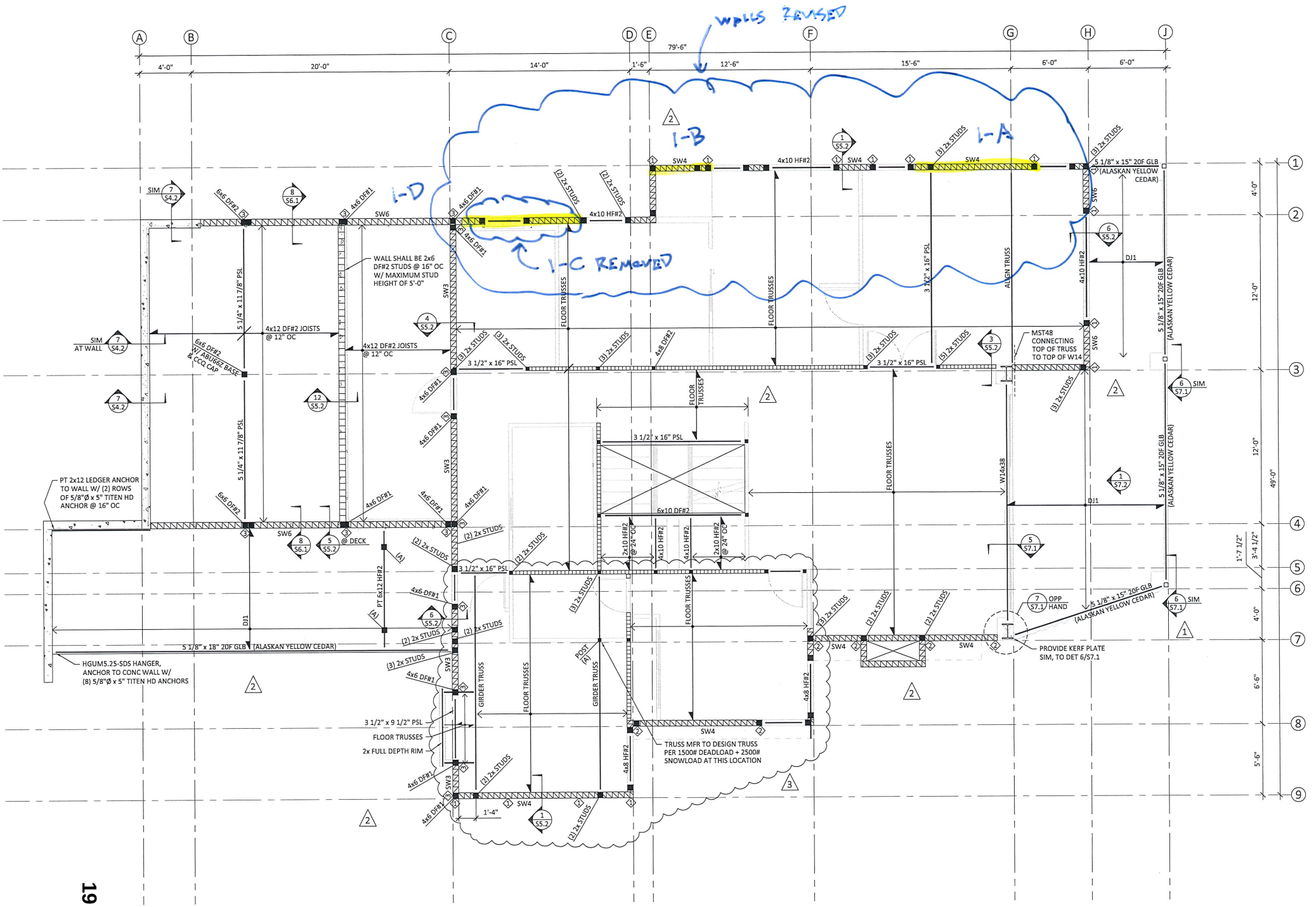



18

1 ROOF FRAMING PLAN - SHEARWALL KEY PLAN

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

2'-0" 0 2'-0" 4'-0"

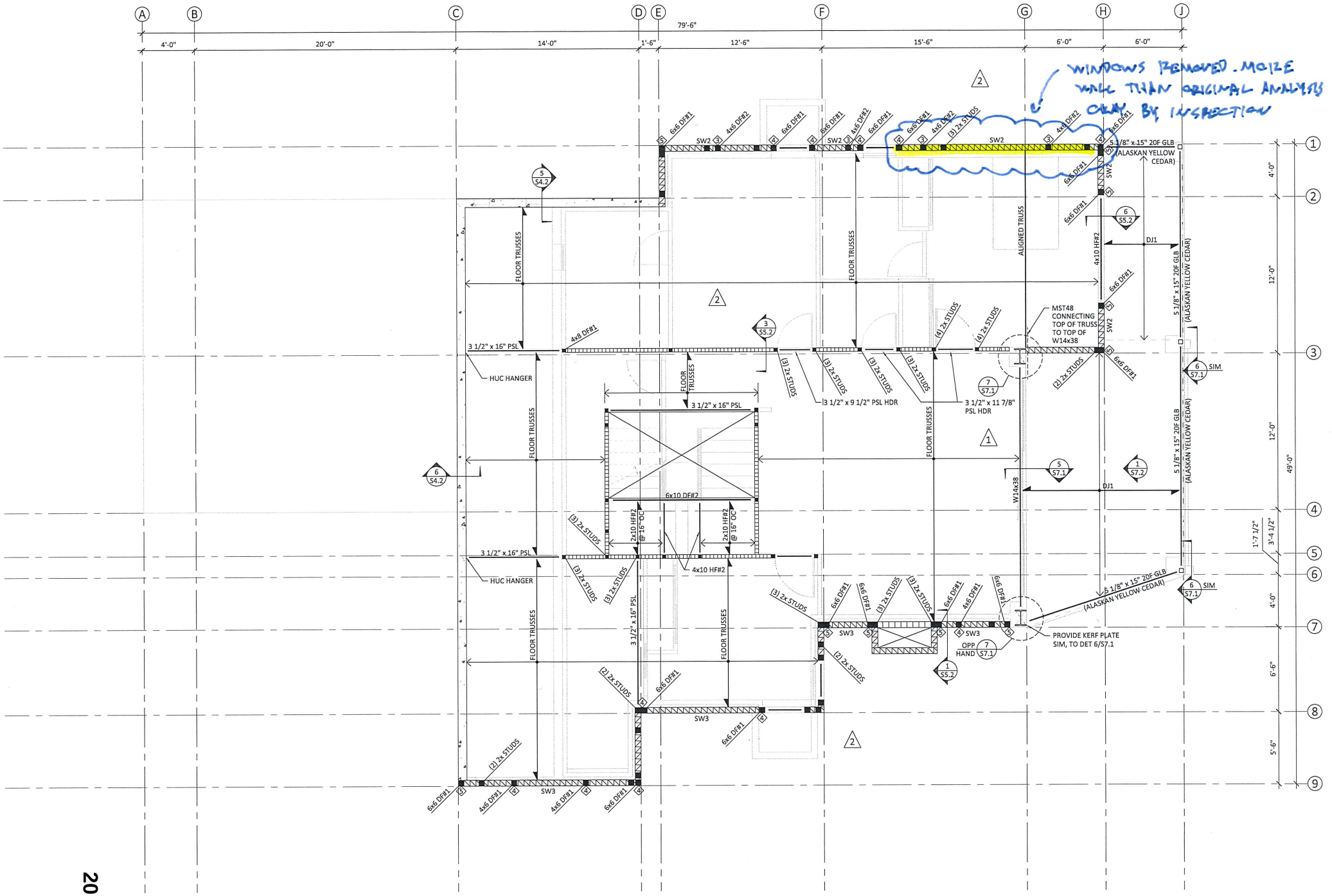



19

1 UPPER FLOOR FRAMING PLAN – SHEAR WALL KEY PLAN

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

2'-0" 0 2'-0" 4'-0"




20

1 MAIN FLOOR FRAMING PLAN – SHEAR WALL KEY PLAN

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

2'-0" 0 2'-0" 4'-0"

## Upper Floor Shear Walls - Walls Below the Roof Framing

## X - Direction Walls

| | | |
|---|---|---|
| Fx (EQ) = | 8.9 | kips (Story Shear) |
| Fx (wind) = | 11.2 | kips (Story Shear) |

| | | |
|---|---|---|
| Wx = | 8897 | PLF seismic |
| Wx = | 11200 | PLF wind |

| | |
|---|---|
| Story HT = | 8.5 |
| Wall HT = | 8.5 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ $(0.6\text{-}0.14S_{DS})DL$ End i | EQ $(0.6\text{-}0.14S_{DS})DL$ End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a | 0.0 | 0.3699 | 0.0 | NA | 132 | #N/A | 0.5 | ####### | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ##### | ##### | ####### | ####### | 3.3 | 5.6 |
| C | b | 11.3 | - | 1.0 | 109 | 132 | SW6 | 10.8 | 1.0 | 1.6 | 1.5 | 1.5 | 1.7 | 1.7 | 0.0 | 0.0 | None | None | - | - |
| B | b | 6.5 | - | 1.0 | 109 | 132 | SW6 | 6.0 | 1.0 | 1.7 | 1.2 | 1.2 | 1.3 | 1.3 | 0.4 | 0.4 | None | None | - | - |
| A | b | 12.5 | - | 1.0 | 109 | 132 | SW6 | 12.0 | 1.0 | 1.6 | 1.6 | 1.6 | 1.8 | 1.8 | 0.0 | 0.0 | None | None | - | - |
| 1 | c | 9.1 | 0.1301 | 1.0 | 85 | 205 | SW6 | 8.6 | 0.8 | 2.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.8 | 1.8 | HDU5 | HDU5 | 1.2 | 3.9 |
| | d | 4.5 | - | 1.0 | 85 | 205 | SW6 | 4.0 | 0.8 | 2.7 | 0.3 | 0.3 | 0.4 | 0.4 | 2.3 | 2.3 | HDU5 | HDU5 | - | - |
| 7 | a | 4.33 | 0.3699 | 1.0 | 185 | 224 | SW6 | 3.8 | 1.8 | 3.0 | 0.3 | 0.3 | 0.4 | 0.4 | 2.6 | 2.6 | MST48 | MST48 | 3.3 | 5.6 |
| | b | 4.5 | - | 1.0 | 185 | 224 | SW6 | 4.0 | 1.8 | 3.0 | 0.3 | 0.3 | 0.4 | 0.4 | 2.6 | 2.6 | MST48 | MST48 | - | - |
| | c | 4.5 | - | 1.0 | 185 | 224 | SW6 | 4.0 | 1.8 | 3.0 | 0.3 | 0.3 | 0.4 | 0.4 | 2.6 | 2.6 | MST48 | MST48 | - | - |
| | d | 4.5 | - | 1.0 | 185 | 224 | SW6 | 4.0 | 1.8 | 3.0 | 0.3 | 0.3 | 0.4 | 0.4 | 2.6 | 2.6 | MST48 | MST48 | - | - |
| 4 | e | 8.33 | 0.1301 | 1.0 | 69 | 167 | SW6 | 7.8 | 0.6 | 2.1 | 0.6 | 0.6 | 0.7 | 0.7 | 1.4 | 1.4 | HDU5 | HDU5 | 1.2 | 3.9 |
| | f | 8.33 | - | 1.0 | 69 | 167 | SW6 | 7.8 | 0.6 | 2.1 | 0.6 | 0.6 | 0.7 | 0.7 | 1.4 | 1.4 | HDU5 | HDU5 | - | - |
| | | | | | | | | | | | | | | | | | | | | |
| | Σ | 1.00 | | | | | | | | | | | | | | | | | 8.9 | 19.0 |

| Shearwalls: 1/2" sheathing w/ HF studs | | | |
|---|---|---|---|
| Nil | - | 0 | plf |
| SW6 | 8d@6"o.c. | 242 | plf |
| SW4 | 8d@4"o.c. | 350 | plf |
| SW3 | 8d@3"o.c. | 455 | plf |
| SW2 | 8d@2"o.c. | 595 | plf |
| 2SW4 | 8d@4"o.c. | 706 | plf |
| 2SW3 | 8d@3"o.c. | 910 | plf |
| 2SW2 | 8d@2"o.c. | 1190 | plf |
| Re-Calc | - | 1200 | plf |

| Holdown Table (Floor Clear Span = 16") | | | |
|---|---|---|---|
| Nil | - | 0 | kips |
| None | - | 0.5 | kips |
| MST37 | (2)-2x HF | 2.345 | kips |
| MST48 | (2)-2x HF | 3.640 | kips |
| MST60 | (2)-2x HF | 5.405 | kips |
| MST72 | (2)-2x HF | 6.475 | kips |
| | | | kips |
| | | | kips |
| | | | kips |
| | | | kips |
| Re-Calc | - | 6.5 | kips |

Input Cell

Input Cell w/ Formula


ENGINEERING

250 4th Ave. South
Suite 200
Edmonds, WA 98020


| | | | |
|---|---|---|---|
| Description: Upper Floor Shear Walls<br>X-Direction | | By: DTR | Date: 03/18/22 |
| | | Checked | Date |
| | | Scale: NTS | Sheet No. |
| Project: Rudolf Res. | | Job No.: 15227.10 | 21 |

**Upper Floor Shear Walls - Walls Below the Roof Framing** — **Y - Direction Walls**

| | | |
|---|---|---|
| Fy (EQ) = | 8.9 | kips (Story Shear) |
| Fy (wind) = | 14.8 | kips (Story Shear) |

| | | |
|---|---|---|
| Wy = | 8897 | PLF seismic |
| Wy = | 14800 | PLF wind |

| | |
|---|---|
| Story HT = | 8.5 |
| Wall HT = | 8.5 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ $(0.6\text{-}0.14S_{DS})DL$ End i | EQ $(0.6\text{-}0.14S_{DS})DL$ End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | a | 2 | 0.13663 | 0.7 | 456 | 361 | SW2 | 1.5 | 2.4 | 5.7 | 0.1 | 0.1 | 0.2 | 0.2 | 5.5 | 5.5 | MST72 | MST72 | 1.2 | 2.0 |
| | b | 2 | - | 0.7 | 456 | 361 | SW2 | 1.5 | 2 | 5.7 | 0.1 | 0.1 | 0.2 | 0.2 | 5.5 | 5.5 | MST72 | MST72 | - | - |
| C | a | 13 | 0.5 | 1.0 | 180 | 214 | SW6 | 12.5 | 1.6 | 2.7 | 0.9 | 0.9 | 1.2 | 1.2 | 1.5 | 1.5 | MST37 | MST37 | 4.4 | 7.4 |
| | b | 11.67 | - | 1.0 | 180 | 214 | SW6 | 11.2 | 1.6 | 2.7 | 0.8 | 0.8 | 1.1 | 1.1 | 1.6 | 1.6 | MST37 | MST37 | - | - |
| G | 1 | 3 | 0.36337 | 0.7 | 665 | 557 | 2SW4 | 2.5 | 4.8 | 8.0 | 0.2 | 0.2 | 0.3 | 0.3 | 7.7 | 7.7 | 0.0 | 0.0 | 1.4 | 2.3 |
| | | | | | | | | | | | | | | | | | | | 1.8 | 3.0 |
| | | Σ | 1.0 | | | | | | | | | | | | | | | | 8.9 | 14.8 |

Walls at garage have 6'-0" height

3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers to north

Input Cell
Input Cell w/ Formula

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

| | | | |
|---|---|---|---|
| Description: Upper Floor Shear Walls<br>Y-Direction | | By: DTR | Date: 03/18/22 |
| | | Checked | Date |
| | | Scale: NTS | Sheet No.: 22 |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

## Main Floor Shear Walls - Walls Below the Upper Floor Framing

**X - Direction Walls**

| | | |
|---|---|---|
| Fx (EQ) = | 7.7 | kips (Story Shear) |
| Fx (wind) = | 11.3 | kips (Story Shear) |

| | | |
|---|---|---|
| Wx = | 7730 | PLF seismic |
| Wx = | 11300 | PLF wind |

| | |
|---|---|
| Story HT = | 10.33 |
| Wall HT = | 9 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | Line Load From Above EQ | Line Load From Above Wind | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ (0.6-0.14$S_{DS}$)DL End i | EQ (0.6-0.14$S_{DS}$)DL End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Net Uplift From Above End i | Net Uplift From Above End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a | 10.0 | 0.38823 | 1.2 | 3.1 | 1.0 | 115 | 170 | SW6 | 9.5 | 1.3 | 2.6 | 0.7 | 0.7 | 0.9 | 0.9 | 0.0 | 0.0 | 1.7 | 1.7 | MST37 | MST37 | 4.2 | 8.7 |
| | b | 4.8 | | - | - | 1.0 | 115 | 170 | SW6 | 4.3 | 1.3 | 2.7 | 0.3 | 0.3 | 0.4 | 0.4 | 0.0 | 0.0 | 2.3 | 2.3 | MST37 | MST37 | - | - |
| | c | 22.0 | | - | - | 1.0 | 115 | 170 | SW6 | 21.5 | 1.2 | 2.5 | 1.8 | 1.8 | 2.3 | 2.3 | 0.0 | 0.0 | 0.2 | 0.2 | None | None | - | - |
| 1 | e | 19.83 | 0.11177 | 1.2 | 3.9 | 1.0 | 102 | 285 | SW4 | 19.3 | 1.1 | 4.2 | 1.9 | 1.9 | 2.3 | 2.3 | 1.8 | 1.8 | 3.7 | 3.7 | MST72 | MST72 | 2.0 | 7.9 |
| 7 | a | 4 | 0.38823 | 3.3 | 5.6 | 0.9 | 256 | 290 | SW4 | 3.5 | 2.7 | 4.8 | 1.1 | 1.1 | 1.2 | 1.2 | 2.6 | 2.6 | 6.3 | 6.3 | MST72 | MST72 | 6.3 | 11.3 |
| | b | 3.67 | - | - | - | 0.8 | 279 | 290 | SW4 | 3.2 | 2.7 | 4.9 | 1.1 | 1.1 | 1.1 | 1.1 | 2.6 | 2.6 | 6.3 | 6.3 | MST72 | MST72 | - | - |
| | c | 10 | - | - | - | 1.0 | 227 | 290 | SW4 | 9.5 | 2.5 | 4.4 | 0.7 | 0.7 | 0.9 | 0.9 | 0.0 | 0.0 | 3.5 | 3.5 | MST48 | MST48 | - | - |
| | d | 10 | - | - | - | 1.0 | 227 | 290 | SW4 | 9.5 | 2.5 | 4.4 | 0.7 | 0.7 | 0.9 | 0.9 | 2.6 | 0.0 | 6.1 | 3.5 | MST72 | MST48 | - | - |
| 4 | a | 23.33 | 0.11177 | 1.2 | 3.9 | 1.0 | 87 | 242 | SW6 | 22.8 | 0.9 | 3.6 | 2.1 | 2.1 | 2.6 | 2.6 | 1.4 | 1.4 | 2.3 | 2.3 | HDU5 | HDU5 | 2.0 | 7.9 |
| | Σ | | 1.0 | 6.8 | 16.5 | | | | | | | | | | | | | | | | | | 14.6 | 35.8 |

| Shearwalls: 1/2" sheathing w/ HF studs | | | |
|---|---|---|---|
| Nil | - | 0 | plf |
| SW6 | 8d@6"o.c. | 242 | plf |
| SW4 | 8d@4"o.c. | 350 | plf |
| SW3 | 8d@3"o.c. | 455 | plf |
| SW2 | 8d@2"o.c. | 595 | plf |
| 2SW4 | 8d@4"o.c. | 706 | plf |
| 2SW3 | 8d@3"o.c. | 910 | plf |
| 2SW2 | 8d@2"o.c. | 1190 | plf |
| Re-Calc | - | 1200 | plf |

| Holdown Table (Floor Clear Span = 16") | | | |
|---|---|---|---|
| Nil | - | 0 | kips |
| None | - | 0.5 | kips |
| MST37 | (2)-2x HF | 2.345 | kips |
| MST48 | (2)-2x HF | 3.640 | kips |
| MST72 | (2)-2x HF | 6.5 | kips |
| HDU8 | 4x DF#2 | 7.0 | kips |
| HDU11 | 6x6 DF#1 | 9.5 | kips |
| HDU14 | 6x6 DF#1 | 14.4 | kips |
| | | | kips |
| | | | kips |
| Re-Calc | - | 6.5 | kips |

Input Cell

Input Cell w/ Formula


ENGINEERING

250 4th Ave. South
Suite 200
Edmonds, WA 98020


| | | | |
|---|---|---|---|
| Description: Main Floor Shear Walls | | By: DTR | Date: 03/18/22 |
| X-Direction | | Checked | Date |
| | | Scale: NTS | Sheet No.: 23 |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

**Main Floor Shear Walls - Walls Below the Upper Floor Framing**

**Y - Direction Walls**

| | | |
|---|---|---|
| Fy (EQ) = | 7.7 | kips (Story Shear) |
| Fy (wind) = | 15.9 | kips (Story Shear) |

| | | |
|---|---|---|
| Wy = | 7730 | PLF seismic |
| Wy = | 15900 | PLF wind |

| | |
|---|---|
| Story HT = | 10.33 |
| Wall HT = | 9 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | Line Load From Above EQ | Line Load From Above Wind | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ (0.6-0.14$S_{DS}$)DL End i | EQ (0.6-0.14$S_{DS}$)DL End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Net Uplift From Above End i | Net Uplift From Above End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | | 0.13663 | 1.2 | 2.0 | | | | | | | | | | | | | | | | | | 2.3 | 4.2 |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| C | a | 11.5 | 0.5 | 4.4 | 7.4 | 1.0 | 274 | 362 | SW3 | 11.0 | 3.0 | 5.5 | 0.8 | 0.8 | 1.0 | 1.0 | 1.5 | 1.5 | 5.9 | 5.9 | MST72 | MST72 | 8.3 | 15.4 |
| | b | 8.16 | - | - | - | 1.0 | 274 | 362 | SW3 | 7.7 | 3.0 | 5.6 | 0.6 | 0.6 | 0.7 | 0.7 | 1.6 | 1.6 | 6.5 | 6.5 | MST72 | MST72 | - | - |
| | c | 6.83 | - | - | - | 1.0 | 274 | 362 | SW3 | 6.3 | 3.1 | 5.6 | 0.5 | 0.5 | 0.6 | 0.6 | 0.0 | 0.0 | 5.0 | 5.0 | MST72 | MST72 | - | - |
| | d | 3.83 | - | - | - | 0.9 | 322 | 362 | SW3 | 3.3 | 3.3 | 6.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 | 0.0 | 5.7 | 5.7 | MST72 | MST72 | - | - |
| G | | 3.83 | 0.36337 | 1.4 | 2.3 | 0.9 | 188 | 235 | SW6 | 3.3 | 1.9 | 3.9 | 0.3 | 0.3 | 0.3 | 0.3 | 7.7 | 7.7 | 11.2 | 11.2 | HDU14 | HDU14 | 1.2 | 2.5 |
| | | 3.83 | - | | | 0.9 | 188 | 235 | SW6 | 3.3 | 1.9 | 3.9 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 | 0.0 | 3.6 | 3.6 | MST48 | MST48 | | |
| | | | | | | | | | | | | | | | | | | | | | | | 3.0 | 5.6 |
| | | | | | | | | | | | | | | | | | | | | | 0.8 | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Σ | 1.0 | 7.1 | 11.8 | | | | | | | | | | | | | | | | | | 14.8 | 27.7 |

No Shearwalls, at grade

3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers to north

Input Cell

Input Cell w/ Formula


ENGINEERING

250 4th Ave. South
Suite 200
Edmonds, WA 98020


| | | | |
|---|---|---|---|
| Description: Main Floor Shear Walls | | By: DTR | Date: 03/18/22 |
| | Y-Direction | Checked | Date |
| | | Scale: NTS | Sheet No.: 24 |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

## Lower Floor Shear Walls - Walls Below the Main Floor Framing

**X - Direction Walls**

| | | |
|---|---|---|
| Fx (EQ) = | 2.9 | kips (Story Shear) |
| Fx (wind) = | 9.4 | kips (Story Shear) |

| | | |
|---|---|---|
| Wx = | 2855 | PLF seismic |
| Wx = | 9400 | PLF wind |

| | |
|---|---|
| Story HT = | 10.1 |
| Wall HT = | 9 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | Line Load From Above EQ | Line Load From Above Wind | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ (0.6-0.14$S_{DS}$)DL End i | EQ (0.6-0.14$S_{DS}$)DL End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Net Uplift From Above End i | Net Uplift From Above End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a | 4.0 | 0.5 | 4.2 | 8.7 | 0.9 | 277 | 418 | SW3 | 3.5 | 2.8 | 6.7 | 0.3 | 0.3 | 0.4 | 0.4 | 1.9 | 0.0 | 8.3 | 6.4 | HDU11 | HDU8 | 5.7 | 13.4 |
| | b | 5.5 | | - | - | 1.0 | 246 | 418 | SW3 | 5.0 | 2.7 | 6.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.0 | 0.0 | 6.0 | 6.0 | HDU8 | HDU8 | - | - |
| | c | 4.5 | | - | - | 1.0 | 246 | 418 | SW3 | 4.0 | 2.8 | 6.6 | 0.3 | 0.3 | 0.4 | 0.4 | 0.0 | 0.0 | 6.2 | 6.2 | HDU8 | HDU8 | - | - |
| | d | 9.0 | | - | - | 1.0 | 246 | 418 | SW3 | 8.5 | 2.6 | 6.3 | 0.6 | 0.6 | 0.8 | 0.8 | 0.0 | 0.0 | 5.4 | 5.4 | HDU8 | HDU8 | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | a | 5.5 | 0.5 | 6.3 | 11.3 | 1.0 | 233 | 343 | SW4 | 5.0 | 2.6 | 5.3 | 0.4 | 0.4 | 0.5 | 0.5 | 6.3 | 6.3 | 11.1 | 11.1 | HDU14 | HDU14 | 7.7 | 16.0 |
| | b | 3.67 | - | - | - | 0.8 | 285 | 343 | SW4 | 3.2 | 2.7 | 5.6 | 0.3 | 0.3 | 0.3 | 0.3 | 6.3 | 6.3 | 11.6 | 11.6 | HDU14 | HDU14 | - | - |
| | c | 10 | - | - | - | 1.0 | 233 | 343 | SW4 | 9.5 | 2.5 | 5.1 | 0.7 | 0.7 | 0.9 | 0.9 | 3.5 | 3.5 | 7.7 | 7.7 | HDU11 | HDU11 | - | - |
| | d | 14 | - | - | - | 1.0 | 233 | 343 | SW4 | 13.5 | 2.4 | 5.0 | 1.0 | 1.0 | 1.3 | 1.3 | 6.1 | 3.5 | 9.9 | 7.3 | HDU14 | HDU11 | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | Σ | | 1.0 | 10.5 | 20.0 | | | | | | | | | | | | | | | | | | 13.4 | 29.4 |

SOLID 1.5'6" WALL ONLY BY INSPECTION

| Shearwalls: 1/2" sheathing w/ HF studs | | | |
|---|---|---|---|
| Nil | - | 0 | plf |
| SW6 | 8d@6"o.c. | 242 | plf |
| SW4 | 8d@4"o.c. | 350 | plf |
| SW3 | 8d@3"o.c. | 455 | plf |
| SW2 | 8d@2"o.c. | 595 | plf |
| 2SW4 | 8d@4"o.c. | 706 | plf |
| 2SW3 | 8d@3"o.c. | 910 | plf |
| 2SW2 | 8d@2"o.c. | 1190 | plf |
| Re-Calc | - | 1200 | plf |

| Holdown Table | | | |
|---|---|---|---|
| Nil | - | 0 | kips |
| None | - | 0.5 | kips |
| HDU2 | (2)-2x HF | 2.215 | kips |
| HDU4 | (2)-2x HF | 3.3 | kips |
| HDU5 | (2)-2x HF | 4.1 | kips |
| HDU8 | 4x DF#2 | 7.0 | kips |
| HDU11 | 6x6 DF#1 | 9.5 | kips |
| HDU14 | 6x6 DF#1 | 14.4 | kips |
| | | | kips |
| | | | kips |
| Re-Calc | - | 14.5 | kips |

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250 4th Ave. South
Suite 200
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| | | | |
|---|---|---|---|
| Description: Lower Floor Shear Walls | | By: DTR | Date: 03/18/22 |
| X-Direction | | Checked | Date |
| | | Scale: NTS | Sheet No.: 25 |
| Project: Rudolf Res. | | Job No.: 15227.10 | |

## Lower Floor Shear Walls - Walls Below the Main Floor Framing

## Y - Direction Walls

| | | |
|---|---|---|
| Fy (EQ) = | 2.9 | kips (Story Shear) |
| Fy (wind) = | 11.0 | kips (Story Shear) |

| | | |
|---|---|---|
| Wy = | 2855 | PLF seismic |
| Wy = | 11000 | PLF wind |

| | |
|---|---|
| Story HT = | 10 |
| Wall HT = | 9 |
| Max h/w | 3.5 |
| $S_{DS}$ = | 0.96 |

| Wall Line | Wall Mark | SW Length | Trib Width | Line Load From Above EQ | Line Load From Above Wind | EQ 2w/h | EQ Shear | Wind Shear | SW Callout | Reduced HD Length | EQ Gross Uplift | Wind Gross Uplift | EQ $(0.6\text{-}0.14S_{DS})DL$ End i | EQ $(0.6\text{-}0.14S_{DS})DL$ End j | Wind 0.6 * DL End i | Wind 0.6 * DL End j | Net Uplift From Above End i | Net Uplift From Above End j | Governing Net Uplift End i | Governing Net Uplift End j | Hold-down End i | Hold-down End j | EQ Line Load | Wind Line Load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| C | | | 0.5 | 8.3 | 15.4 | | | | | | | | | | | | | | | | | | 9.7 | 20.9 |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| | | | - | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| G | 1 | 3.83 | 0.5 | 1.2 | 2.5 | 0.9 | 283 | 458 | SW2 | 3.3 | 2.8 | 7.4 | 0.3 | 0.3 | 0.3 | 0.3 | 11.2 | 11.2 | 18.3 | 18.3 | 0.0 | 0.0 | 1.8 | 4.9 |
| | 2 | 3.83 | - | | | 0.9 | 283 | 458 | SW2 | 3.3 | 2.8 | 7.4 | 0.3 | 0.3 | 0.3 | 0.3 | 3.6 | 3.6 | 10.7 | 10.7 | HDU14 | HDU14 | | |
| | | | | 3.0 | 5.6 | | | | | | | | | | | | | | | | | | 3.8 | 8.7 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Σ | 1.0 | 12.5 | 23.5 | | | | | | | | | | | | | | | | | | 15.4 | 34.5 |

Full-Height Concrete Basement Wall

3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers to north

Input Cell

Input Cell w/ Formula


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250 4th Ave. South
Suite 200
Edmonds, WA 98020


| | | | |
|---|---|---|---|
| Description: Lower Floor Shear Walls | | By: DTR | Date: 03/18/22 |
| | Y-Direction | Checked | Date |
| | | Scale: NTS | Sheet No.: 26 |
| Project: Rudolf Res. | | Job No.: 15227.10 | |