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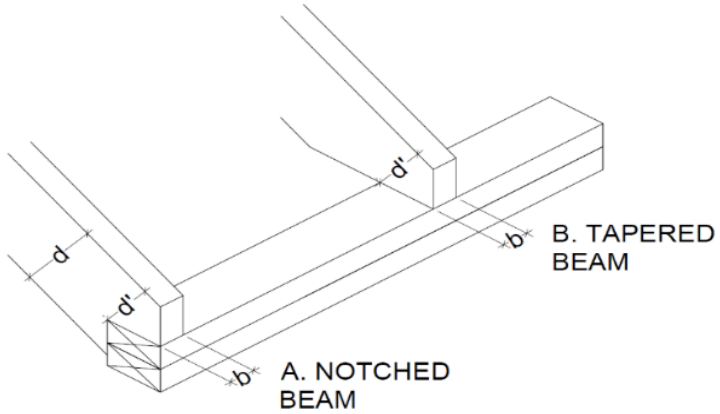
|---|---|
| Project: | 21-373 Lot 101 Woodside Ridge |
| Client: | New Mark Homes |
| Engineer: | CJH |
| Date: | 9/14/2022 |
| Description: | Notched Hip |

# NOTCHED HIP OR VALLEY CALCULATION

| | | |
|---|---|---|
| Location | | |
| Hip or Valley | Hip | |
| Type of notch | Tapered Beam | |
| Type of lumber | LVL | |
| Width of Member - b | 1.75 in | |
| Depth of Member (Unnotched) - d | 11.88 in | |
| Depth of Member at Notch ⊥ to edge - d ' | 4.00 in | |
| Span Length of Member - L | 9.25 ft | |
| Angle Between the Ridge and the Hip - Θ | 40° | |
| Roof Dead Load on horizontal plane - $W_D$ | 10 psf | |
| Roof Live Load on horizontal plane - $W_{LR}$ | 20 psf | |
| Factored Load applied to Hip - $W_t$ | 30 psf | LC: D + LR |
| Shear Force in Member at Notch - V | 211 lb | |
| Load Duration Factor - Cd | 1.25 | NDS Table 2.3.2 |
| Actual Shear Stress in Member at Notch - fv | 45 psi | |
| Reference Shear Design Value - Fv | 285 psi | |
| Allowable Shear Stress - F'v | 356 psi | Fv ' = Fv * Cd |
| Design Unity Ratio | **0.13 : 1** | **Pass** |




## Design Equations Used

The shear force in the member at the notch is calculated as:

For hips: $$V = \frac{WL^2 \sin\theta \cos\theta}{6}$$

For valleys: $$V = \frac{WL^2 \sin\theta \cos\theta}{3}$$

The actual shear stress in the member at the notch is calculated as:

For notched members: $$f_v = \frac{3V}{2bd'}\left[\frac{d}{d'}\right]^2$$

For tapered members: $$f_v = \frac{3V}{2bd'}$$