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Structural Design Narrative of the CFS-NHERI 10-story Test Building for Multi-dimensional Shake Table Testing

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Abstract

Cold-formed steel (CFS) framing is a popular choice for construction of low to mid-rise structures because it provides significant cost benefits through use of prefabricated assemblies and produces lightweight structures with high durability and ductility. It is manufactured from recycled materials, exhibits consistent material behavior offering a high strength-to-weight ratio and is resistant to corrosion. Benefits of CFS framing align well with the system resiliency needs in moderate to high seismic zones from a performance perspective. However, the use of CFS framing for construction of mid to high-rise structures in the North American construction industry is severely restricted due to a lack of available full-scale system level test data documenting both earthquake and post-earthquake fire response of CFS-framed buildings. To address this issue, a 10-story CFS-framed building, herein referred to as the *CFS-NHERI* test building, is planned to be tested under increasing earthquake motion intensity, and subsequently subjected to live fire testing, at the NHERI 6-DOF Large High-Performance Outdoor Shake Table (LHPOST6) facility at University of California, San Diego. This paper documents the structural design and detailing decisions adopted for the gravity and lateral force resisting systems of the CFS-NHERI test building, which will have a floor plan of 11.0 m×6.9 m (36 ft×22.5 ft) and consistent 3.05 m (10 ft) story height. This building will also be the first to integrate architectural finishes and will have a 30.5 m (100 ft) building height which exceeds the height limitations set by the ASCE 7 design standards.

1. Introduction

The use of cold-formed steel (CFS) in North American building construction industry has seen a significant growth in the past 25 years. Even though the predominant application of CFS framing thus far has been for the construction of interior partition walls and exterior curtain walls, the use of CFS framing for both gravity and lateral force resisting systems (LFRS) in buildings is becoming prominent. The need for low-cost, multi-hazard resilient, mid-rise buildings has pushed for the development of fully CFS-framed building solutions. CFS framing offers significant cost benefits through low installation costs, particularly when prefabricated assemblies are used, and low maintenance costs, due to its resistance to corrosion [1]. CFS framing is a lightweight framing option which offers high durability and ductility, uses a high strength-to-weight ratio material that resists fire spread in case of accidents due to its non-combustible nature. CFS-framed buildings have significant potential for improved seismic resiliency and post-earthquake fire performance needed in moderate to high seismic zones.

Research conducted on the various components such as shear walls, floor diaphragms, and nonstructural partition walls, additionally complemented by investigation of screw connection and member buckling behavior, which are utilized in CFS framing has led to the development of codes and standards such as AISI S100 [2], S240 [3], S400 [4] to support component-level design. Although these experimental studies have significantly contributed to advance understanding of the behavior of CFS framing components, investigations of the system-level performance of CFS-framed buildings have only begun more recently. Due to the paucity of available full-scale system-level benchmark test data, documenting both seismic and post-

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earthquake fire response of CFS-framed buildings, is a barrier to bringing the potential benefits of this system to the community. Only two shake table test programs have investigated the full building seismic performance: and demonstrated that the necessary seismic structural performance can be achieved. Peterman et al. [5] documented the seismic response of a two-story CFS-framed building within the CFS-NEES project. Hutchinson et al. [6] discussed the earthquake and post-fire earthquake response of a six-story CFS-framed building within the CFS-HUD project. These tests highlighted the crucial importance of the overstrength provided by the non-seismic wall and/or finish elements to the unique behavior of repetitively framed systems.

1.1 CFS-NHERI scope

In an effort to complement prior CFS research contributions, and in particular system-level investigations of their seismic behavior, the CFS-NHERI project: Seismic Resiliency of Repetitively Framed Mid-Rise Cold-Formed Steel Buildings, funded through the National Science Foundation (NSF), is being undertaken as a multi-university-industry collaborative effort. CFS-NHERI intends to advance the knowledge of the seismic performance of mid-rise CFS-framed building systems and to use this knowledge to support improvements in the seismic design codes for such systems: ASCE 7-16 [7], ASCE 41-17 [8], AISI S400 etc. Namely, this effort identifies two important facets that are not well understood: 1) the full impact of architectural finishes, both exterior and interior on CFS wall systems, and 2) the impact of gravity framing and all other framing that is along the same wall line as the LFRS. In addition, details required for these CFS-framed systems to move from a few stories to full mid-rise (>6 stories) are not universally agreed upon and in some cases traditional details, e.g., use of large built-up packs of CFS studs for shear wall chord studs, are known to be inefficient. To further our understanding of these issues, a 10-story CFS-framed building will be constructed and tested at the newly upgraded NHERI 6-DOF Large High-Performance Outdoor Shake Table Facility (LHPOST6) (nheri.ucsd.edu). This experimental program will also provide a unique opportunity to evaluate the post-earthquake fire performance of the earthquake damaged building. Notably unique to this tall building will be the integration of architectural finishes and a building height exceeding the height limitation set by current design standards. The experiments will provide vital full-scale system-level benchmark test data for a state-of-the-art CFS building under multidirectional seismic inputs leading to seismic design code improvements. It will also advance knowledge of the post-earthquake fire and post-fire earthquake (aftershock) performance of mid-rise CFS construction.

The present effort was a collaboration with practicing engineering, with ClarkDietrich Engineering Services leading the overall development of design calculations and construction drawings, and DCI Engineers contributing the tie-rod detailing design. The structural design criteria was defined based on engagements between the research team and industry partners. This paper documents the decisions taken during the design of the CFS-NHERI test building. It also discusses the design of the gravity and lateral force resisting systems and lays out a roadmap of near-term activities planned as part of preparations for the CFS-NHERI capstone experiments.

2. Design Decisions

2.1 Design criteria and beyond-code provisions

The 10-story test building was designed as a CFS-framed building at a hypothetical location in a high seismic region near Irvine, California (coordinates: 33.69˚N, -117.83˚W) and a corresponding NEHRP Site Class: C (very dense soil and soft rock) condition. Gravity and lateral loads were determined as per the 2018 edition of the International Building Code (IBC) [9] based on this location. As a result, the following design parameters were assumed in accordance with ASCE 7-16: risk category: II, spectral acceleration at short periods, $S_s = 1.261g$, spectral acceleration at a period of 1s, $S_1 = 0.452g$, and design spectral accelerations, $S_{DS} = 1.009g$ and $S_{D1} = 0.452g$. Figure 1 shows the pseudo-acceleration elastic response spectrum for the selected site. The LFRS of the test building consisted of Type I shear walls with single-sided steel sheet sheathing and ledger framing for floor-to-wall connections. The seismic design parameters R (response modification coefficient), Ω_o (over-strength factor) and C_d (deflection amplification factor) for light-frame (cold-formed steel) walls sheathed with steel sheets were taken as 6.5, 3.0 and 4.0, respectively as per ASCE 7-16. Lateral requirements of seismic design, based on the chosen hypothetical location, were allowed to govern the design of LFRS. Wind design of the LFRS was based on the measured wind speeds which did not exceed 30 kmph (19 mph) at the shake table test site of LHPOST6 in San Diego, California, and did not govern the LFRS design. The overall building design complied with current code provisions within ASCE 7-16 *Minimum Design Loads for Buildings and Other Structures*, AISI S100-15 *North American Specification for the Design of Cold-formed Steel Structural Members*, AISI S240-15 *North American Standard for Cold-Formed Steel Structural Framing*, and AISI S400-15 *North American standard for seismic design of cold-formed steel structural systems*.

The test structure was designed to have a building height of 30.5 m (100 ft), which exceeds the height limitation of 19.8 m (65 ft) set by the current ASCE 7-16 design standard. This building height was selected to push the limits of current engineering practice and eliminate barriers for mid-rise CFS buildings. Increasing the height of the building increases the shear and overturning moment demands on the shear walls. Torabian et al. [10] assessed the application of current design specifications to low-rise to high-rise buildings located in a high-seismic zone with CFS-framed gravity and lateral force resisting systems, and showed its limitations, such as the need for large built-up chord stud packs, even for 6-story buildings. Similarly, the shear wall seismic shear demands for a 10-story building require tight fastener spacing for shear walls at mid-height levels and are often beyond the tabulated steel sheet shear wall capacities provided in AISI S400 for lower levels [11]. Such issues can lead to an inefficient and/or impractical design. In the current test building design, these issues are addressed by extending the shear wall capacities beyond AISI S400 using recently available experimental data, where larger capacity shear walls with steel sheet sheathing have been documented [12]-[14]. Additionally, to overcome the chord stud capacity limitation for taller CFS buildings, the lower stories of the test building use HSS sections as chord members to meet the overturning moment demand, as shown in Figure 2b. The screw connection behavior to support the use of steel sheet sheathing with HSS sections was investigated through connection tests conducted by Zhang et al. [15] within the CFS-NHERI project.

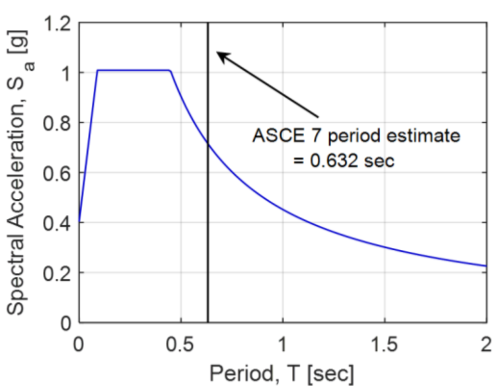
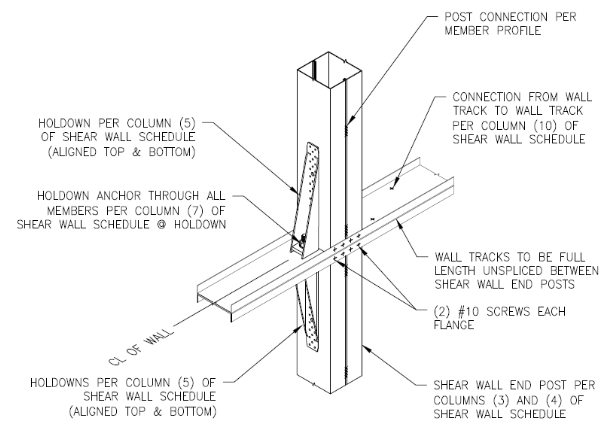
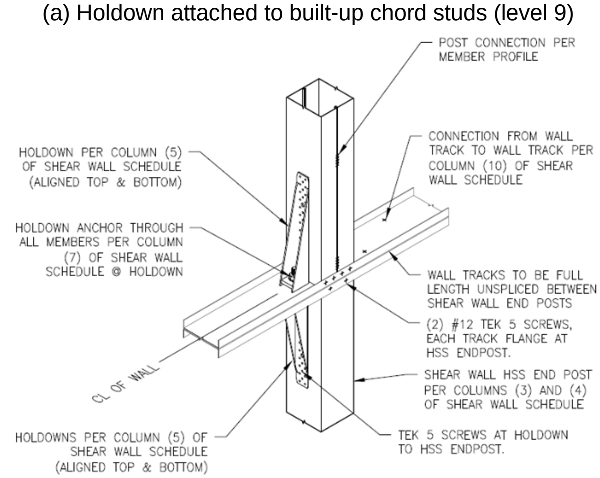


Figure 1: Psuedo-acceleration response spectrum for selected site

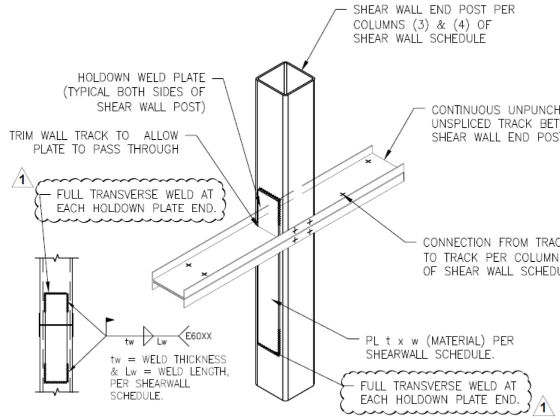
Holdowns have been traditionally used in light-frame construction as the overturning and uplift restraint system. Holdowns transfer chord member forces through anchors to the floor or building foundation. However, design of shear walls can often be limited due to holdown capacity available where large lateral capacity is required. In such cases, a plate holdown can be used to transfer chord stud forces through the building floor by welding the plate to the chord members of two adjacent stories. Another increasingly popular overturning and uplift restraint system for multi-story construction is the continuous tension tie-rod system. A tension tie-down system consists of a combination of rods, coupler nuts, bearing plates and shrinkage compensation devices which work together to create a continuous load path to the foundation. At the system level, Wang and Hutchinson [16] have highlighted the benefits of such continuous rod tie-down systems in multi-story buildings in effectively resisting building collapse as they facilitate redistribution of loads and framing action. Additionally, the tie-down available capacity issue is usually not encountered while designing with tension tie-rods. Recent testing by Singh et al. [17] aimed at characterizing the lateral behavior of wall-line assemblies demonstrated that wall-lines using holdowns achieved higher lateral strength. However, this was accompanied by undesirable failure in the holdowns at larger drift demands, while tension tie-rods remained essentially linear elastic. Due to the importance of determining the viability of both holdowns and tension tie-rods in mid-rise construction, the test building was designed to incorporate both tie-down systems. The LFRS in the longitudinal direction is detailed with shear walls with holdowns or plate holdowns, while the LFRS in transverse direction is detailed with shear walls with a floor-to-floor continuous tension tie-rod system. Figure 2 shows the different tie-down detailing systems used in the two directions at different stories of the test building.



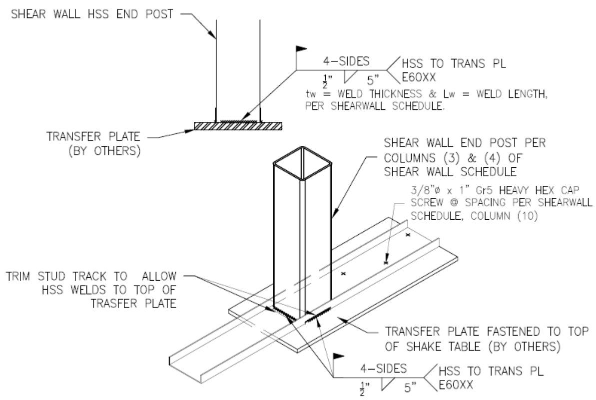
(a) Holdown attached to built-up chord studs (level 9)



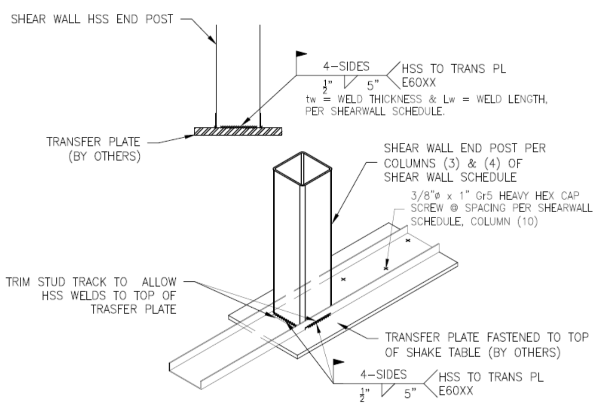
(b) Holdown attached to HSS section (level 7)



(c) Plate holdown attached to HSS section (level 4)



(d) HSS section welded to transfer plate on shake table (level 1)



(e) Tension tie-rod between chord members (level 3)

Figure 2: Tie-down systems used in test building

2.2 Archetype building

A CFS-framed archetype building was designed having a 35.4 m × 14.6 m (116 ft × 48 ft) typical floor plan based on the plan provided in Example-1 of the IBC SEAOC Structural/Seismic Design Manual Vol. 2: Four story wood light-frame structure [18]. Given the size limitations of the shake table, a slice of the archetype building that may be accommodated within the shake table platen area of 12.2 m × 7.6 m (40 ft × 25 ft) was selected and redesigned as the test building, see Figure 3.

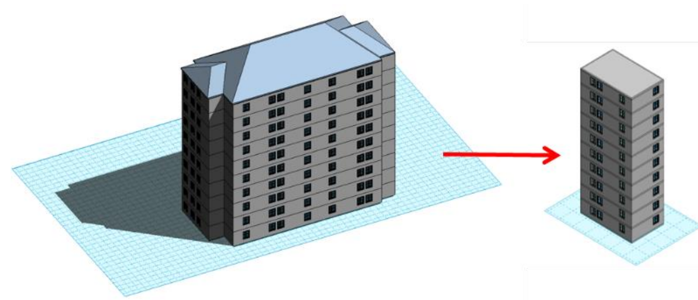


Figure 3: Conceptual sketch of CFS-NHERI 10-story CFS-framed archetype (left) and test building (right)

Selecting the optimal slice of the archetype building got consideration as a test building was a point of active discussion amongst the research-industry team. Figure 4 shows the different slice options of the archetype building, each with its advantages and disadvantages. Option 1 (shown in red) was a symmetric slice which included interior, exterior and corridor shear walls. But it required significant changes to the floor plan to fit the shake table footprint. Option 3 (shown in yellow) similarly offered a mix of interior, exterior and corridor shear walls without changing the floor plan. However, it was an asymmetric slice of the archetype with significantly different centers of mass and rigidity. Such an issue was not seen in the complete archetype floor plan or usual building plans. Intentional introduction of torsion into the building slice was considered undesirable. Option 2 (shown in green) was chosen as the floor plan for the test building slice. It offered the benefits of options 1 and 3, without the asymmetry or required floor plan changes. Moreover, the availability of a shear wall in the center of plan allowed for floor-based wall behavior comparisons, or introduction of a standalone prefabricated or another specialty designed CFS wall bracing system such as a hardy CFS moment frame system [19], preferably at the upper levels.

Figure 5 shows the floor plan of the test building. The test building was redesigned with slight modifications to the chosen floor plan. To bring the center of rigidity further closer to center of mass, lines 1 and 2 were revised to have equal shear wall lengths. Shear walls on every floor were targeted to have similar lengths and seismic demands as calculated during the design of the archetype building. In addition, to incorporate both tie-down detailing systems, shear walls in the east-west direction were designed with holdowns or plate holdowns, while shear walls in north-south direction (lines C, D and E) were designed with tension tie-rods. Lengths of shear wall along lines C, D and E were further suitably modified to allow for locations of the tension tie-rods to fall directly on the 0.6 m × 0.6 m (2 ft × 2 ft) shake table tie-down pattern. The location of doors in the corridor (line 2) were moved towards the center of the wall-line where a 31.7 m (104 ft) tall self-supporting stair tower, which is unattached from the shake table and test building, is planned to provide direct access to each floor of the building. Floor-to-floor access via the stair tower will be facilitated using platforms which can be removed during testing. Additional doors were introduced in lines C and E to allow access to all parts of the floor. To account for the eliminated corridor floor, supplemental mass was added on wall line 2.

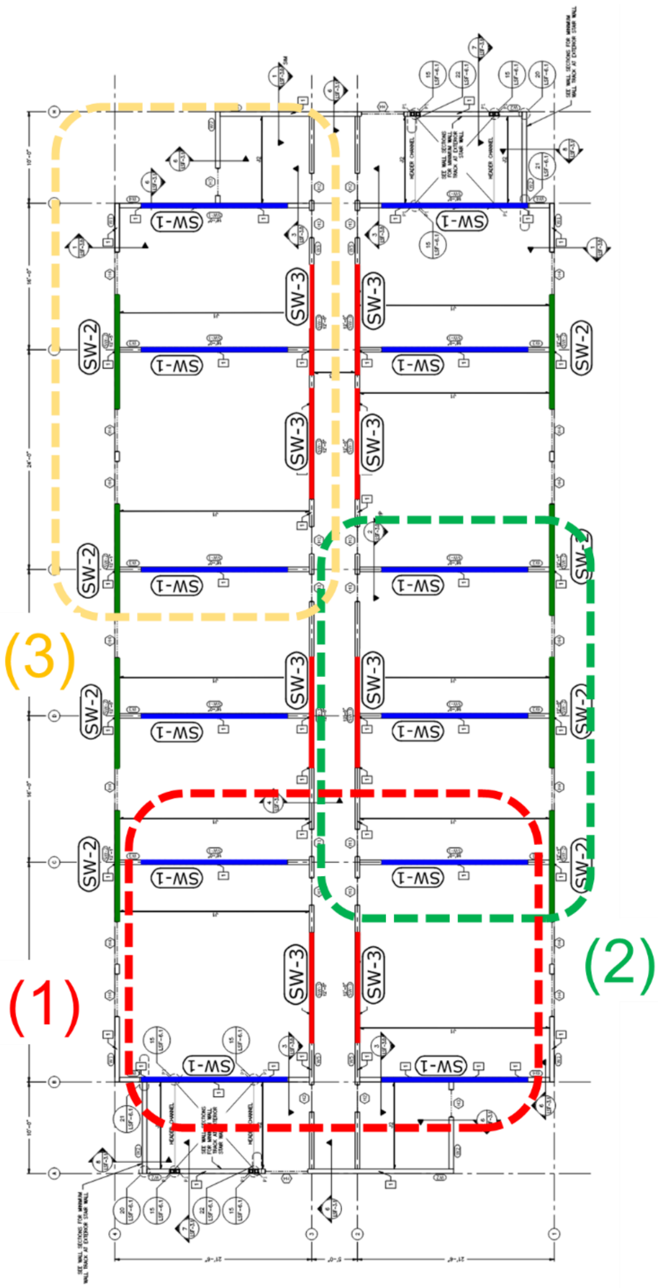


Figure 4: Archetype building slice options (color regions overlaid with original archetype building plan set)

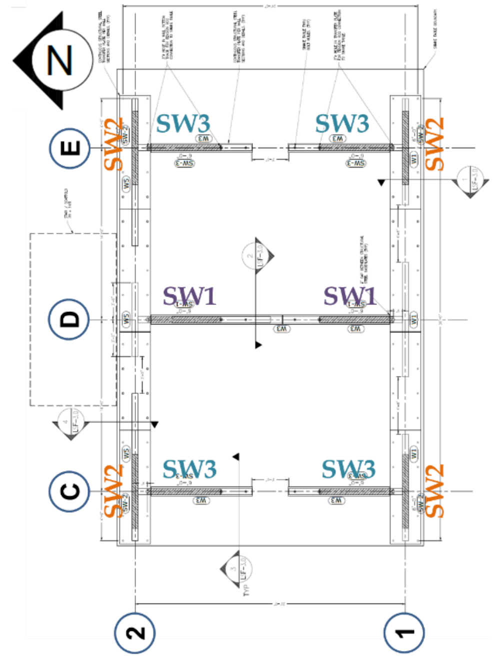


Figure 5: Floor plan of the 10-story CFS building test specimen

It can be seen from Figure 5 that the building uses symmetric wall lines with Type I steel sheet sheathed shear walls on each end. Additionally, wall lines C, D, E and 2 will have fire-rated gypsum board finish, typical of interior walls. Similarly, wall line 1 will have exterior insulation finishing system (EIFS). These wall-lines are similar to the wall-lines specimens tested in a recently concluded experimental program within the CFS-NHERI project. In this program, Singh et al [20]-[23] tested 4.88 m long (16 ft) and 2.74 m (9 ft) tall wall-line assemblies both using the unidirectional shake table at the time and quasi-static (top loaded) reversed cyclic loading. These various configurations included specimens in an unfinished or finished, symmetrical or unsymmetrical, Type I or Type II shear wall detailing configuration, tension tie-rods or holdowns as anchorage detailing, and with or without a window opening. Finish application on an exterior wall-line increased the wall lateral strength by 14.66 kN/m (1,005 lb/ft) [24]. The behavior of wall-lines used within the test building at a component level is derived from these results. Similarly, the test building will also adopt a light gauge steel frame (LSF) floor system, built using CFS channel section joists with fire-resistant cement board subfloor panels. Within the CFS-NHERI project, Castaneda [25] recently tested floor diaphragm assemblies using CFS joists and various panels to characterize the lateral performance of such floor systems at component level. The system level tests will build on the learnings from the connection-level and component levels tests performed within the CFS-NHERI project. Finally, it is notable that the test building will adopt use of prefabricated CFS wall-lines and floor diaphragms for rapid construction at the test site.

3. Design Summary

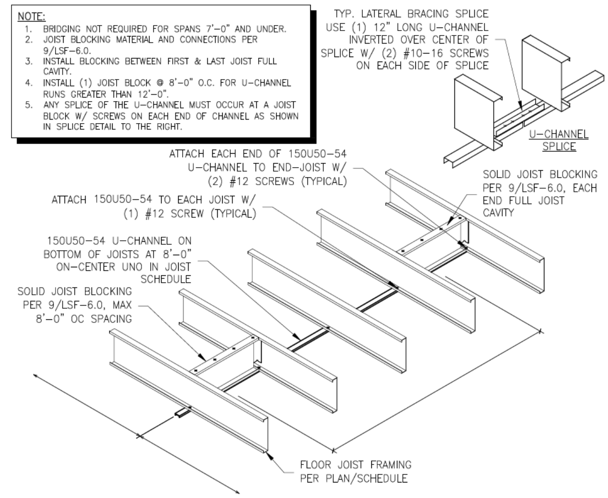
Appendix 1 contains the design calculation package, while Appendix 2 contains the design drawings. Member designations are used as per SSMA/SFIA standards.

3.1 Gravity system

The building will use the ledger framing system which attaches floor and roof joists to the inside flanges of the load-bearing studs via a combination of track and clip angles. Studs are broken at the top of each floor level and capped with a track. Walls above are stacked on the lower wall top track. These details are shown in detail 4 and 6 of LSF-6.0 in Appendix 2. Floor/roof joists ran in the transverse direction (north-south direction), see Figure 5.

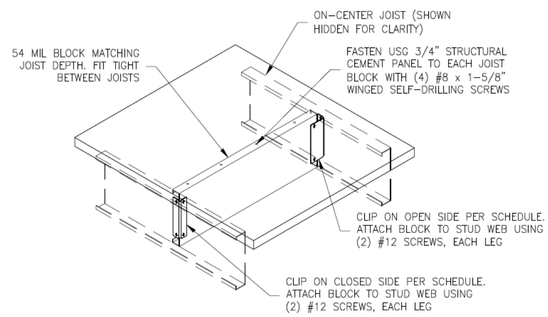
3.1.1 Floor and roof joists

Floor joists were designed as simple span members with distributed loads. Roof joists were designed as simple span members with uniform loading. End rigidity of the attachment to the stud walls was not considered in the joist design. Design loads for floors included 1.0 kPa (21 psf) dead load, and 2.39 kPa (50 psf) live load which included 0.48 kPa (10 psf) partition load to account for partitions that may be moved at various times during the structure's life span. Floor joist deflection was limited to L/480 for live load and L/240 for total loads. Design loads for roof included 1.15 kPa (24 psf) dead load, 0.96 kPa (20 psf) live load and wind uplift per IBC requirements. Roof joist deflection was limited to L/360 for live load and L/240 for total loads. Note that the k_ϕ for distortional buckling was taken as zero. Based on these loads and a maximum clear span of 6.55 m (21.5 ft), 1200S250-68 for floor joists and 1200S250-54 for roof joists at 0.41 m (16 in) on center were selected. The compression flange of the joists was considered continuously braced via attachment of cement board panel. Blocking and/or bridging were specified in order to minimize joist rotation. Figure 6 shows the joist bridging and blocking details. Because the web height-to-thickness for the selected roof joists exceeded 200, web stiffeners were required at member ends. Stiffening was accomplished with clip angles screwed to the joist and to the rim (ledger) track. This method transfers the reaction from the joist web to the support in direct shear rather than bearing, thus precluding web crippling failure in the joists. Similarly, due to the higher end reactions and relatively short bearing length, web stiffeners were required at floor joist ends. Stiffening was accomplished in the same way as at the roof, but with additional fasteners required due to higher loads. Drawings related to floor and roof joists can be found in LSF-3.0, LSF-6.0 and LSF-6.1 in Appendix 2.



(a)

ClarkDietrich CLIP CONNECTOR		
JOIST DEPTH	OPEN SIDE	CLOSED SIDE
12"	E549	S549
8"	E545	S545



(b)

Figure 6: (a) Joist bridging and (b) joist blocking

3.1.2 Load-bearing walls

Load-bearing walls are present on all wall lines around the door and window openings and in between shear walls These walls are sheathed with 16 mm (5/8 in) gypsum panels on both sides of the framing using #6 screws at 10.2 cm (4 in) perimeter spacing and 15.2 cm (6 in) field spacing. This fastener spacing changed to 20.3 cm (8 in) perimeter and field spacing when gypsum panels are installed away from wall corner zones. Studs are placed at 0.61 m (24 in) on center spacing within the gravity walls. Appendix 2 provides the stud sizes used in the gravity walls at different levels in the test building. Wall track was selected to have the depth and thickness to match the on-center stud. It should be noted that the 0.61 m stud spacing is different from the 0.41 m joist spacing. Due to this, some joists did not have an in-line connection to the stud. For such an off-module connection to stud additional screws were used to connect the rim track to the studs adjacent to the joist location. Details used at typical floor and roof locations are provided in Appendix 2. Wall-lines C and E had a 2.18 m

(7 ft 2 in) tall and 1.02 m (3 ft 4 in) wide door opening in the middle of the shear walls. Wall-line 2 has two same sized door openings in between the load-bearing walls. Wall-line 1 has two 1.22 m (4 ft) tall and 1.42 m (4 ft 8 in) wide window openings. Appendix 2 provides the details of the jamb stud, cripple stud, head and sill track framing members used in the window and door openings, with drawings provided in LSF-2.1, LSF-2.2 and LSF-4.0

3.2 LFRS

Seismic demand is defined, per ASCE 7, using the site characteristics of the hypothetical project location of Irvine, California. Based on the structural system and building height, building fundamental period is estimated, per ASCE 7, as 0.632 s. A base shear coefficient C_s is calculated as 0.110. The effective seismic weight, W used in ASCE 7-16 Eq'n 12.8-1 was estimated as 1460.1 kN (328.24 kip), based on estimated weights of roof, floor and exterior walls. Seismic base shear force was calculated as 160.5 kN (36.09 kip). The vertical distribution of the calculated shear demand, based on ASCE 7-16 section 12.8.3, is shown in Appendix 2. To account for the weight of certain architectural features excluded from the construction (e.g., flooring, insulation etc.), additional cement panels are proposed for installation on the floor diaphragm at each floor from the second floor through the roof. For example, a stack of two 19 mm (3/4 in) cement panels provides an estimated weight of 0.58 kPa (12.0 psf) which may be added as supplement weight on all the floors excluding roof. For the roof, a stack of three cement panels with an estimated weight of 0.76 kPa (15.9 psf) is planned for use as supplement weight. To account for the eliminated corridor floor, supplemental mass in the form of 32 mm (1.25 in) thick steel plate nestled inside the rim track on wall line 2 is detailed to supplement the 0.73 kN/m(50 plf) corridor tributary weight.

3.2.1 Shear walls

As shown in Figure 5, two 1.83 m (6 ft) long shear walls were placed in the longitudinal direction (east-west direction) along both lines 1 and 2 (SW2). Similarly, two 1.83 m (6 ft) long shear walls were placed in the transverse direction along lines C, D and E (SW1 and SW3). The story shear demands were distributed to the different shear walls based on their tributary areas and stiffness. Based on this shear distribution, wall details were selected using AISI S400 and recent experimental data on larger capacity shear walls. It should be noted that in this analysis, the wall stiffness did not include additional stiffness that will be provided by interior (gypsum panels) and/or exterior finishes (EIFS). Analysis of shear walls in both directions can be found in Appendix 1. Shear walls SW1 and SW2 used 0.686 mm (27 mil) thick steel sheet for levels 8-10, and 0.838 mm (33 mil) thick steel sheet for levels 1-7. Shear wall SW3 used 0.686 mm thick steel sheet for levels 6-10, and 0.838 mm thick steel sheet for levels 1-5. Shear walls in both directions with the thicker sheet detailing used #10 screws and were also fully blocked. Shear walls in both directions with the thinner sheet detailing used #8 screws. Edge fastener spacing and minimum framing member thickness varied at different levels of the building. Appendix 2 shows the detailing variation for all Type I shear walls at different levels of the building. Shear wall drawings can be found in LSF-2.0, LSF-2.1, LSF-2.2, and LSF-5.0 in Appendix 2.

3.2.2 Shear wall chord studs/compression post

Shear wall chord studs were designed for load combinations per ASCE 7-16, section 2.4.1 including dead, live and both lateral and vertical seismic loads. Eccentric moment due to both gravity (ledger on inside face of stud) and seismic (shear panels on outside face of stud) loads were included. Chords were sized based on ASD load combinations in addition to the strength requirements of AISI S400, E2.4.1.2. Chord stud strength was checked at the minimum of the amplified seismic load, or the maximum seismic load the system can deliver as allowed in AISI S400. Chord stud analysis can be found in Appendix 1. Chord studs for shear walls SW2 in the longitudinal direction on levels 7-10 were detailed as built-up stud-packs, while levels 1-6 used HSS A500 steel tube as end post. HSS posts had a square 15.2 cm×15.2 cm (6 in×6 in) cross-section with thickness varying from 4.76 mm (3/16 in) at level 6 to 9.53 mm (3/8 in) at level 1. In the transverse direction, shear walls contain a pair of tie-down subassemblies consisting of tension tie-rods connected by couplers sandwiched between compression posts made of built-up stud packs. The compression posts vary from a single stud at level 10 to a 3-ply stud built-up section at level 1 for shear walls SW3. Due to higher seismic shear demand on shear walls SW1, the compression posts vary from a single stud at level 10 to a 4-ply stud built-up section at level 1. Drawings, and detailing variation at different levels, for the chord studs/compression post in the longitudinal direction can be found in Appendix 2, sheet LSF-5.0.

3.2.3 Holdowns and tension tie-rods

As mentioned earlier, the shear walls in the longitudinal direction of the building are detailed with holdowns or plate holdowns, while the shear walls in the transverse direction are detailed with a continuous tension tie-rod system. Shear walls SW2 use holdowns on levels 7-10 which will be attached to the chord stud pack or HSS post using screws. Due to higher demands than available holdown capacities, plate holdowns are used in shear wall SW2 on levels 1-6 instead and will be attached to the HSS post by welding. Two different types of steel rods will be used for the tie-down system: (1) all-thread rods, and (2) Z-rods which have threads at both ends to facilitate connection using a coupler. These steel rods will be fabricated using either ASTM A36 or ASTM A193 Grade B7 (zinc-coated) steel material. The tie-rod diameter will vary from 16 mm (5/8 in) at level 10 to 51 mm (2 in) at level 1 for both SW1 and SW3 shear walls. Drawings and detailing variation at different levels can be found in Appendix 2, sheet LSF-5.0.

3.2.4 Diaphragms

Analysis of the gravity loads suggests optimal support at the floor levels can be accomplished with 1200S250-68 members used as typical floor joists and 1200S250-54 members used as roof joists. The floor joists are connected to a 1200TD125/250-68 rim track using S547 angle clip with #12 screws vertically spaced over the flange. Similarly, the roof joists were connected to a 1200TD125/250-54 rim track using S547 angle clip with #12 screws. A 19 mm (3/4 in) cement panel with fasteners at 15.2 cm (6 in) on center at supported edges and 30.5 cm (12 in) on center in the field was selected for all floors and the roof. Figure 7 shows the connection of the typical floor diaphragm with cement panel to the wall framing. Drawings for the floor and roof diaphragm can be found in LSF-6.0 in Appendix 2.

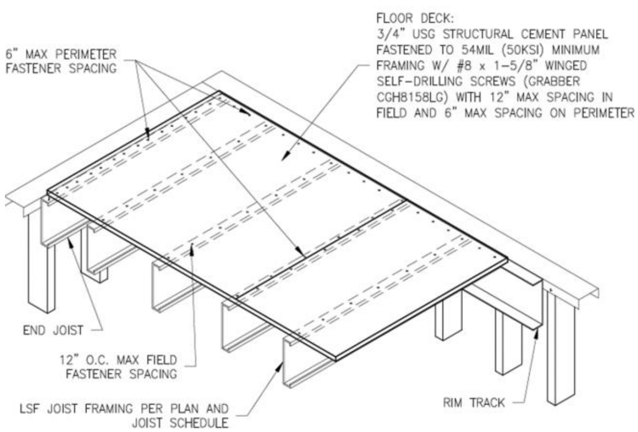


Figure 7: Typical floor diaphragm connection to wall framing

4. Roadmap of Near-term Activities

The CFS-NHERI capstone 10-story building shake table experiments will provide a unique opportunity to characterize the seismic behavior of the state-of-the-art CFS-designed building and in particular understand the impact of architectural finishes, non-designated systems, such as gravity walls or window/door framing, and nonstructural components on building behavior. Test protocols for the system-level shake table test programs often consist of a sequence of earthquake tests of increasing intensity, which progressively damage the test specimen. To develop a suitable test protocol for the CFS-NHERI test building, multiple numerical modeling approaches such as lumped mass model, shear dominated pancake-style 2D model [26], and simplified 3D model are currently being pursued by the research team. These numerical models, being developed in OpenSeesPy [27], use hysteretic elements for structural members such as shear walls which have been validated using available component level test. The aim of such pre-test numerical modeling is to provide predictions of the test building seismic behavior, which can guide earthquake motion selection and a motion scaling strategy for defining the test protocol. Complemented with an on-the-fly motion scaling parameter adjustment methodology, such as the one developed by Wang et al [28], which can account for the evolution of dynamic properties during testing, a test protocol sufficiently developed such that it is possible to assess the seismic performance of structural and nonstructural components at multiple predefined performance levels, for example: elastic (service), quasi-elastic, design, and above design. The test protocol will also include ambient vibration and low-amplitude white-noise tests conducted during construction, as well as before and after earthquake tests, to track the dynamic characteristics of the building specimen through system identification during its life on the shake table. The building specimen will be densely instrumented to capture accelerations, forces, and displacements. In addition, digital still and video imagery will be captured throughout construction, testing and de-erection.

Finally, the test protocol will include several controlled live-fire tests, possibly followed by subsequent scaled earthquake motion tests to evaluate the post-earthquake fire performance and post-fire earthquake (aftershock) performance of the damaged test building. While under normal (non-earthquake) conditions, fire protective covering (e.g., stucco) over combustible insulation can provide resistance to fire spread, there is no research into the performance of such exterior systems on CFS-framed structures during and following earthquake. The test protocol will help determine the impact damage to various fire-rated construction features (e.g., walls, doors, floors), combustible components (e.g., EIFS layer), window/door framing etc. has on potential fire spread and life safety. The test building will be instrumented with thermocouples, smoke sensors, and cameras, with a focus on compartment temperatures, transmission of smoke and hot gasses through compartment barriers, and performance of egress systems.

Based on IBC and AISI requirements, the CFS-NHERI 10-story test building was designed for multi-dimensional shake table testing. Several decisions that were taken during the design process have been discussed in this paper. A design summary of the gravity and lateral force resisting systems has been provided. The drawings and calculation package produced have been included as appendices herewith. Several key steps such as the development of test protocol and instrumentation plans, material takeoffs and procurement/delivery, preparing shop drawings for construction etc. will be taken in the upcoming weeks. This experimental program offers an opportunity for industry collaborations for incorporating novel proprietary systems into the test building LFRS. Similarly, it provides an opportunity for researchers or engineers to bring forth creative payload testing ideas. The CFS-NHERI capstone experiment program will generate valuable knowledge leading to improvements in the seismic design codes for CFS-framed building.

5. Acknowledgments

The research presented is funded through the National Science Foundation (NSF) grants CMMI 1663569 and CMMI 1663348, project entitled: Collaborative Research: Seismic Resiliency of Repetitively Framed Mid-Rise Cold-Formed Steel Buildings. Complementary post-earthquake live fire testing is being undertaken by Professor Richard Emberley at CalPoly-San Luis Obispo with support of the California Seismic Safety Commission. The efforts of NHERI operations manager Dr. Koorosh Lotfizadeh in test program planning and 2021 NHERI REU student Jessé Hernández-González from University of Puerto Rico - Mayagüez in developing test building renders are greatly appreciated. Findings, opinions, and conclusions are those of the authors and do not necessarily reflect those of the sponsoring organizations.

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COLD-FORMED STEEL FRAMING COMPUTATIONS

Project Information:

2150200882-1

CFS-NHERI 10 Story Test Portion

Project Location:

San Diego, CA

Prepared For:

Cold-Formed Steel Research Consortium

CFSRC - 208 Latrobe Hall - Civil Eng. 3400 N. Charles St.

Baltimore, MD 21218

Submittal Date:

Apr. 20, 2022

ClarkDietrich Engineering Services
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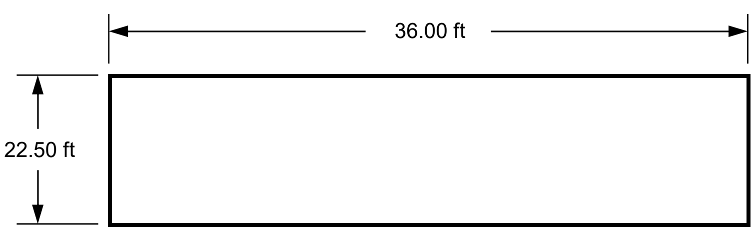
www.ClarkDietrich.com

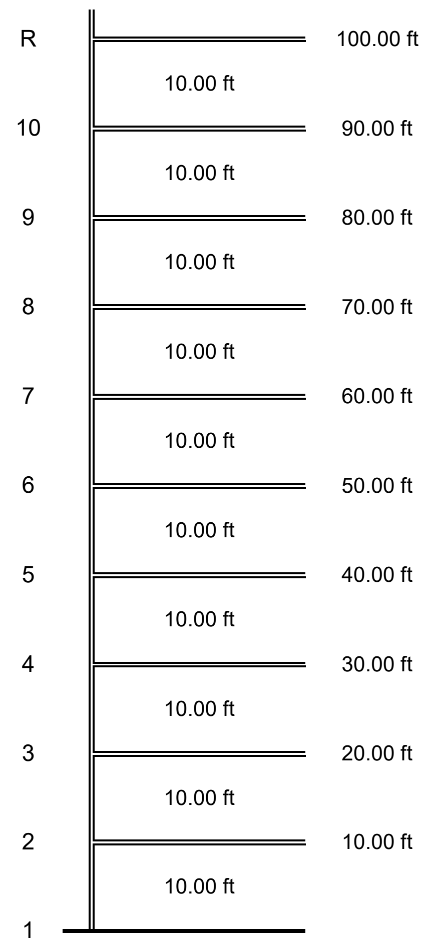
CDES NUMBER:	2150200882	**ENGINEER:**	L. Padgett
PROJECT NAME:	CFS-NHERI 10 Story Test Portion	**DATE:**	3/22/2022
SITE LOCATION:	Irvine, CA	**CHECKER:**	LAP
CDES OFFICE:	West	**CHECK DATE:**	
STATUS:	10-Story Test Portion Design		

BUILDING PROPERTIES

BUILDING WIDTH:		36.00 ft
BUILDING BREADTH:		22.50 ft
MEAN ROOF HEIGHT:	h =	100.00 ft
ROOF ANGLE:	Θ =	



ROOF HEIGHT = 3.75 ft



DESIGN CRITERIA

DESIGN CODE / SPECIFICATION: **2018 IBC** CBC 2016
RISK CATEGORY: CATEGORY II

AISI SPECIFICATION: 2016 NAS - US (ASD) 2012 NAS - US (ASD)

ASD WIND LOADING

BASIC WIND SPEED: Vasd = 90 mph Vnom = 115 mph
EXPOSURE CATEGORY: EXPOSURE C
ENCLOSURE TYPE: ENCLOSED

ASD VELOCITY PRESSURE AT h: 14.43 psf
ASD PEAK MWFRS PRESSURE: 18.80 psf
INTERNAL PRESSURE: 5.00 psf

SEISMIC LOADING

SITE CLASSIFICATION SITE CLASS C
DESIGN ACCELERATION S_{DS} = 1.0088
DESIGN ACCELERATION S_{D1} = 0.4520
RESPONSE MODIFICATION R_{TRANS} = 6.5
R_{LONG} = 6.5
SEISMIC DESIGN CATEGORY D

SNOW LOADING

GROUND SNOW LOAD: p_g =
FLAT ROOF SNOW LOAD: p_f =
SLOPED ROOF SNOW LOAD: p_s =

PROJECT NOTES

Coordination Items:
- Archetype building is generally based on the SEAOC Structural/Seismic Design Manual Vol. 2: Four story wood light-frame structure.
- 10ft level heights, 3ft parapets, EIFS exterior cladding
- U-channel bridging at 3ft & 7ft, strongback locations at brace force of 675 lb max to be shown on plans. Call out on wall sections 3ft and 7ft punchouts when ordering.
- flat roof and floors with C-shape joist and 3/4" USG cement board. G556 floor fire assembly, P561 roof fire assembly.
- C-shape unit joist at 16" oc from corridor to exterior, public and corridor joist at 24" oc from corridor to corridor.
- 2" minimum joist flange for cement panel fastener space. Cement panel diaphragm and installation per USG instructions and PER-14076 roof and PER-13067 floor. 18ga minimum, but with 50Ksi minimum - so we'll use 16ga minimum.
- Typical sheet steel shearwalls as needed in exterior, corridor, and demising walls
- Design loads based on real world rigid insulation, floor topping, partitions, MEP, cladding...
- Drop-in stairs, c-shape joist landings
- CDES to design the full 48' x 116' building design, then a slice of it will be installed on the 25' x 40' shake table.
- Windows and doors may be actually installed.
- Cement board floor panels start and stop at ledger framing, each side of wall. shear flow transfer through rim - wall track - rim.
- Rim-Track and Rim-Channel options.
- Wind and Seismic designed for the worse case of 2018 IBC / ASCE 7-16 and 2016 CBC / ASCE 7-10.

Test Portion
- 22.5' x 36' symmetric shearwall layout
- Shearwall lengths based on the actual test portion area and mass + supplemental mass to acheive archetype loads, then length of SW's adjusted to impose loads similar to the archetype, but satisfying typical industry accepted aspect ratio h/w < or = 2.0.
- Joist span is a bit longer (from 20'-9" to 21'-6"). 21’-6”. 1200S250-68 @ 16” oc 82% TL defl = L/408.
- Fasten weight to top of corridor side of W5 wall (DL=50plf), might disregard. This can be 1.25" steel plate nested inside rim-channel.
- 36' exterior walls in front only (E-W), demising walls only (N-S). Wall weights over 855 sf = 13.83 psf. Seismic DL = 21psf + 14psf = 35psf without additional exterior wall load.
- Base connection plates to the 2ft x 2ft threaded hole grids. PAF's similar to wall bottom track at oc studs, and 3/8" hex head cap screws with pre-drilled/tapped holes similar to the 3/8 concrete screws in track for shearwalls and posts. SW endpost weld plate holdowns to base connection plates - but threaded hole in base connection plate where using threaded rod tie-down.
- Added Fully Blocked -33 sheet steel capacity for 16ga to 12ga framing at 2:1 aspect ratio. Added 2-sided -27 sheet capacity for 12ga framing. Rogers sheet thickness has a wide range of thicknesses but we are using standard 22ga and 20ga thicknesses?
- Since we're only 38ft wide, but with full wind - the ASCE 7 wind load is over half of the archetype longitude shearwalls. Allowing seismic to govern and then backing out the wind to specify the design wind speed we are acheiving. Longitude wind approximately equivalent to the seismic is 75 mph Exposure C, 8 windward psf + 2.4 leeward psf. Transverse wind approximately equivalent to the SW-1 and SW-3 Demising seismic is 63 mph

DESIGN CODE CRITERIA

DESIGN CODE / SPECIFICATION:	**2018 IBC**		**2016 CBC**	
RISK CATEGORY:	CATEGORY II			
AISI SPECIFICATION:	**2016 NAS - US (ASD)**		2012 NAS - US (ASD)	

ASD WIND LOADING

BASIC WIND SPEED:	Vasd = 85 mph	Vnom = 110 mph	Vasd= 90 mph	Vnom= 115 mph
EXPOSURE CATEGORY:	EXPOSURE C			
ENCLOSURE TYPE:	ENCLOSED			
INTERNAL PRESSURE:	5.00 psf			
ASD VELOCITY PRESSURE AT h:	14.43 psf			

ASD MWFRS WL PRESSURI	LEVEL 10:	18.80 psf	LEVEL 5:	16.80 psf
	LEVEL 9:	18.50 psf	LEVEL 4:	16.20 psf
	LEVEL 8:	18.10 psf	LEVEL 3:	15.50 psf
	LEVEL 7:	17.70 psf	LEVEL 2:	14.50 psf
	LEVEL 6:	17.30 psf	LEVEL 1:	13.90 psf
ASD MWFRS LL PRESSURE	LEVEL 10:	5.35 psf		

SNOW LOADING

GROUND SNOW LOAD:	p_g =	0 psf
EXPOSURE FACTOR:	Ce =	1.00
THERMAL FACTOR:	Ct =	1.00
IMPORTANCE FACTOR:	I =	1.00
ROOF SLOPE FACTOR:	Cs =	1.00
FLAT ROOF SNOW LOAD:	p_f =	0 psf
MINIMUM FLAT ROOF SNOW LOAD	p_f =	0 psf
SLOPED ROOF SNOW LOAD:	p_s =	0 psf

SEISMIC DESIGN CRITERIA

OCCUPANCY CATEGORY	CATEGORY II
IMPORTANCE FACTOR	I = 1.00
SITE CLASSIFICATION	SITE CLASS C

MCE SPECTRAL RESPONSE ACCELERATION, SHORT PERIOD	S_S = 1.2610	Figure 1613.3.1(1)
MCE SPECTRAL RESPONSE ACCELERATION, 1 SECOND PERIOD	S_1 = 0.4520	Figure 1613.3.1(2)
SHORT-PERIOD SITE COEFFICIENT	F_a = 1.2000	Table 1613.3.3(1)
LONG-PERIOD SITE COEFFICIENT	F_v = 1.5000	Table 1613.3.3(2)
DESIGN SPECTRAL RESPONSE ACCELERATION, SHORT PERIOD	S_{DS} = 1.0088	Equation 16-39
DESIGN SPECTRAL RESPONSE ACCELERATION, 1 SECOND PERIOD	S_{D1} = 0.4520	Equation 16-40

<u>SEISMIC DESIGN CATEGORY - D</u> *TABLES 1613.3.5 (1) AND 1613.3.5(2)*

GRAVITY LOADING

WALL TYPES

WALL TYPE	WIND LOAD	DEAD LOAD	DEFLECTION
INTERIOR WALL	5.00 psf	12 psf	L / 240
EXTERIOR WALL (EIFS)	18.80 psf	15 psf	L / 360

FLOOR / CEILING TYPES

FLOOR TYPE	DEAD LOAD	SNOW LOAD	LIVE LOAD			TOTAL LOAD	
			LIVE	ROOF LIVE	DEFL.	LOAD	DEFL.
ROOF	24 psf			20 psf	L / 360	44 psf	L / 240
UNIT	21 psf		50 psf		L / 480	71 psf	L / 240
CORRIDOR	21 psf		40 psf		L / 480	61 psf	L / 240
PUBLIC	21 psf		100 psf		L / 480	121 psf	L / 240

[1] 10psf PARTITION LOADING IS INCLUDED IN THE UNITFLOOR LIVE LOAD

ROOF DEAD LOAD DEVELOPMENT	
COMPONENT	DEAD LOAD
ROOFING MEMBRANE	1.50 psf
RIGID INSULATION	5.00 psf
3/4 CEMENT PANEL ROOF DECK	5.30 psf
CFS ROOF JOIST	3.00 psf
INSULATION	1.00 psf
5/8" GYP. BOARD W/FURRING	3.00 psf
MECHANICAL	5.00 psf
TOTAL:	23.80 psf

FLOOR DEAD LOAD DEVELOPMENT	
COMPONENT	DEAD LOAD
FINISH FLOORING	3.00 psf
3/4 CEMENT PANEL SUBFLOOR	5.30 psf
CFS FLOOR JOIST	3.50 psf
INSULATION	1.00 psf
5/8" GYP. BOARD W/FURRING	3.00 psf
MECHANICAL / OTHER	5.00 psf
TOTAL:	20.80 psf

EXTERIOR WALL DEAD LOAD DEVELOPMENT	
COMPONENT	DEAD LOAD
EIFS CLADDING	2.50 psf
5/8 EXTERIOR GYPSUM	3.00 psf
CFS WALL STUDS	3.50 psf
INSULATION	1.00 psf
5/8" GYP. BOARD	2.50 psf
MISC	2.00 psf
TOTAL:	14.50 psf

INTERIOR WALL DEAD LOAD DEVELOPMENT	
COMPONENT	DEAD LOAD
5/8 GYP. BOARD	2.50 psf
CFS WALL STUDS	3.50 psf
INSULATION	1.00 psf
5/8" GYP. BOARD	2.50 psf
MISC	2.00 psf
TOTAL:	11.50 psf

SEISMIC LOADING PER ASCE 7-16 & CBC 2016 (EQUIVALENT LATERAL FORCE PROCEDURE)

SEISMIC DESIGN CRITERIA

IMPORTANCE FACTOR	I_e = 1.00	*TABLE 11.5-1*
DESIGN SPECTRAL RESPONSE ACCELERATION, SHORT PERIOD	S_{DS} = 1.0088	*EQUATION 11.4-3*
DESIGN SPECTRAL RESPONSE ACCELERATION, 1 SECOND PERIOD	S_{D1} = 0.4520	*EQUATION 11.4-4*

SEISMIC DESIGN CATEGORY - D

APPROXIMATE BUILDING PERIOD

h_n = 100.00 ft	*HEIGHT FROM BASE TO HIGHEST LEVEL*	
T_a = 0.632 SEC	*EQUATION 12.8-7,* $T_a = C_T * h_n^x$	C_T = 0.02
		x = 0.75
0.8 T_S = 0.358 SEC	*SECTION 11.4.5,* $T_S = S_{D1} / S_{DS}$	

BUILDING SEISMIC RESPONSE - TRANSVERSE DIRECTION

RESPONSE MODIFICATION COEFFICIENT	R = 6.5	*TABLE 12.2-1*	Bearing wall system, 16. light-frame
SYSTEM OVERSTRENGTH FACTOR	Ω_0 = 3.0	*TABLE 12.2-1*	walls sheathed with steel sheets
REDUNDANCY FACTOR	ρ = 1.0	*SECTION 12.3.4*	
GOVERNING SEISMIC RESPONSE COEFFICIENT	$C_{S,\ TRANS}$ = 0.110	*SECTION 12.8.1, SEE DETERMINATION BELOW*	

SEISMIC RESPONSE COEFFICIENT	Cs = S_{DS} / (R / I)	Cs = 0.155	*EQUATION 12.8-2*
	Cs NEED NOT EXCEED S_{D1} / T (R / I)	Cs ≤ 0.110	*EQUATION 12.8-3*
	Cs SHALL NOT BE LESS THAN 0.01	Cs ≥ 0.010	*EQUATION 12.8-5*

BUILDING SEISMIC RESPONSE - LONGITUDINAL DIRECTION

RESPONSE MODIFICATION COEFFICIENT	R = 6.5	*TABLE 12.2-1*
SYSTEM OVERSTRENGTH FACTOR	Ω_0 = 3.0	*TABLE 12.2-1*
REDUNDANCY FACTOR	ρ = 1.0	*SECTION 12.3.4*
GOVERNING SEISMIC RESPONSE COEFFICIENT	$C_{S,\ LONG}$ = 0.110	*SECTION 12.8.1, SEE DETERMINATION BELOW*

SEISMIC RESPONSE COEFFICIENT	Cs = S_{DS} / (R / I)	Cs = 0.155	*EQUATION 12.8-2*
	Cs NEED NOT EXCEED S_{D1} / T (R / I)	Cs ≤ 0.110	*EQUATION 12.8-3*
	Cs SHALL NOT BE LESS THAN 0.01	Cs ≥ 0.010	*EQUATION 12.8-5*

SEISMIC LOADING PER ASCE 7-16 & CBC 2016 (EQUIVALENT LATERAL FORCE PROCEDURE)

FLOOR DEAD LOAD

LEVEL	WEIGHT *psf*	FLOOR AREA *sf*	FLOOR WEIGHT *kips*
ROOF	24.0	810	19.44
10	42.4	810	34.31
9	42.4	810	34.31
8	42.4	810	34.31
7	42.4	810	34.31
6	42.4	810	34.31
5	42.4	810	34.31
4	42.4	810	34.31
3	42.4	810	34.31
2	42.4	810	34.31
		TOTAL FLOOR DEAD LOAD =	328.24 k

Note: Seismic DL includes partitions
and exterior cladding
GL 2 - 36' x 10' x 12psf Int Wall = 4320 lb
GL C, D, E - 21.5' x 10' x 12psf In Wall = 7740lb
GL 1 - 36' x 10' x 15psf Ext Wall = 5400 lb
Total Wall Seismic Weight = 17460lb/810sf = 21.6psf
Total Floor Seismic Weight = 20.8 psf

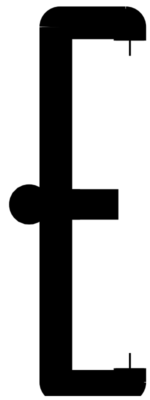
VERTICAL DISTRIBUTION OF SEISMIC FORCES

BUILDING EFFECTIVE SEISMIC WEIGHT W = 328.24 k *SECTION 12.7.2*

SEISMIC BASE SHEAR V_{TRANS} = 36.09 k *EQUATION 12.8-1*
V_{LONG} = 36.09 k *EQUATION 12.8-1*

			k = 1.07		TRANSVERSE	LONGITUDINAL
LEVEL	ELEVATION - h_x *ft*	WEIGHT - w_x *kips*	$w_x h_x^k$	Cv	F_x *kips*	F_x *kips*
ROOF	100.00	19.44	2637	0.1154	4.165	4.165
10	90.00	34.31	4160	0.1821	6.571	6.571
9	80.00	34.31	3669	0.1606	5.795	5.795
8	70.00	34.31	3182	0.1393	5.026	5.026
7	60.00	34.31	2700	0.1182	4.264	4.264
6	50.00	34.31	2223	0.0973	3.511	3.511
5	40.00	34.31	1752	0.0767	2.768	2.768
4	30.00	34.31	1289	0.0564	2.037	2.037
3	20.00	34.31	837	0.0366	1.322	1.322
2	10.00	34.31	400	0.0175	0.631	0.631
1						

Section: 1200S250-68.sct ClarkDietrich Building Systems
1200S250-68, 50 ksi Stud ClarkDietrich Building Systems
SSMA Library
Rev. Date: 1/22/2011 8:58:01 AM
By: RSG Software
Printed: 10/27/2021 9:56:55 AM



Section Inputs

Material: A653 SQ Grade 50/1
Apply strength increase from cold work of forming.

Modulus of Elasticity, E	29500	ksi
Yield Strength, Fy	50	ksi
Tensile Strength, Fu	65	ksi
Warping Constant Override, Cw	0	in^6
Torsion Constant Override, J	0	in^4
Net Section Ratio (Lnet/L)	0.1	

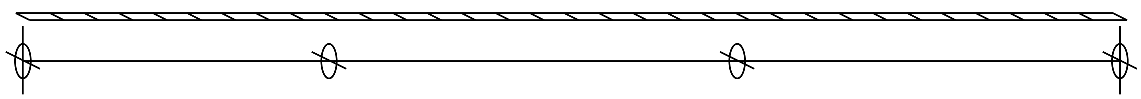
Stud, Thickness 0.0713 in (14 Gage)
Placement of Part from Origin:

X to center of gravity	0	in
Y to center of gravity	0	in

Outside dimensions, Open shape

	Length (in)	Angle (deg)	Radius (in)	Web	k Coef.	Hole Size (in)	Distance (in)
1	0.625	270.000	0.10700	None	0.000	0.000	0.313
2	2.500	180.000	0.10700	Single	0.000	0.000	1.250
3	12.000	90.000	0.10700	Cee	0.000	1.500	6.000
4	2.500	0.000	0.10700	Single	0.000	0.000	1.250
5	0.625	-90.000	0.10700	None	0.000	0.000	0.313

Analysis: 21-6 Test Unit Floor Joist @ 16 OC.cfsa ClarkDietrich Building Systems
21-6 Unit Floor Joist @ 16 OC ClarkDietrich Building Systems
200882 CFS-NHERI 10-Story Archetype
Rev. Date: 6/3/2021 12:29:52 PM
By: ClarkDietrich Building Systems
Printed: 10/27/2021 9:56:55 AM



Analysis Inputs

Members

	Section File	Revision Date and Time
1	1200S250-68.sct	1/22/2011 8:58:01 AM

	Start Loc. (ft)	End Loc. (ft)	Braced Flange	R	kϕ (lb)	Lm (ft)
1	0.000	21.500	Top	0.0000	0.0000	8.000

	ex (in)	ey (in)
1	0.000	0.000

Supports

	Type	Location (ft)	Bearing (in)	Fastened	K
1	XYT	0.000	2.00	Yes	1.0000
2	XT	6.000	1.00	No	1.0000
3	XT	14.000	1.00	No	1.0000
4	XYT	21.500	2.00	Yes	1.0000

Loading: Dead Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	270.000	0.000	21.500	28.000	28.000	lb/ft

Loading: Live Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	-90.000	0.000	21.500	67.000	67.000	lb/ft

Load Combination: D+L
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Live Load	1.000

```
Load Combination: Live Load Deflection
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Live Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D+0.75(Lr+S)+0.75*W pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Wmwf pos                     0.750
  4 Snow Load                    0.750

Load Combination: D+0.75(Lr+L)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Live Load                    0.750

Load Combination: D + Lr
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D + Wcc (Down)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wc&c pos                     1.000

Load Combination: 0.6D + Wcc (Uplift)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    0.600
  2 Wc&c neg                     1.000

Load Combination: D + Wmwf pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wmwf pos                     1.000
```

Member Check - 2016 North American Specification - US (ASD)

Load Combination: D+L
Design Parameters at 10.750 ft:

Lx	21.500 ft	Ly	8.000 ft	Lt	8.000 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000

Section: 1200S200-68.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi

Cbx	1.0209	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kϕ	0 lb		
Red. Factor, R: 0		Lm	8.000 ft		

Loads:	P (lb)	Mx (lb-in)	Vy (lb)	My (lb-in)	Vx (lb)
Total	0.0	65871	0.0	0	0.0
Applied	0.0	65871	0.0	0	0.0
Strength	5171.1	75438	2770.2	9375	4394.0

Effective section properties at applied loads:

Ae	1.13807 in^2	Ixe	21.466 in^4	Iye	0.473 in^4
		Sxe(t)	3.4971 in^3	Sye(l)	1.1933 in^3
		Sxe(b)	3.6621 in^3	Sye(r)	0.2949 in^3

Interaction Equations

NAS Eq. H1.2-1	(P, Mx, My)	0.000 + 0.873 + 0.000 = 0.873 <= 1.0
NAS Eq. H2-1	(Mx, Vy)	Sqrt(0.571 + 0.000)= 0.756 <= 1.0
NAS Eq. H2-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

Maximum Shears, Moments, and Deflections

Load Combination: D+L, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.000	0.0	1021.3	1021.3
21.500	-1021.3	0.0	1021.3

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
10.750	65871	10.750	-0.63232	

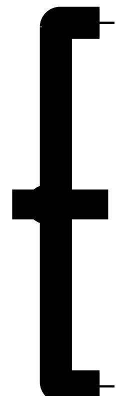
Maximum Shears, Moments, and Deflections

Load Combination: Live Load Deflection, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.000	0.00	720.25	720.25
21.500	-720.25	0.00	720.25

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
10.750	46456	10.750	-0.44595	

Section: 1200T150-68.sct ClarkDietrich Building Systems
1200T150-68, 50 ksi Track ClarkDietrich Building Systems
SSMA Library
Rev. Date: 1/1/2003 1:54:12 PM
By: RSG Software
Printed: 10/27/2021 10:22:33 AM



Section Inputs

Material: A653 SQ Grade 50/1
Apply strength increase from cold work of forming.

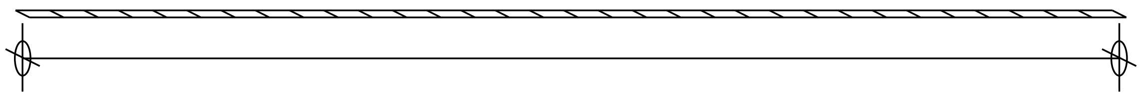
Modulus of Elasticity, E	29500	ksi
Yield Strength, Fy	50	ksi
Tensile Strength, Fu	65	ksi
Warping Constant Override, Cw	0	in^6
Torsion Constant Override, J	0	in^4

Track, Thickness 0.0713 in (14 Gage)
Placement of Part from Origin:

X to center of gravity	0	in
Y to center of gravity	0	in

Outside dimensions, Open shape

	Length (in)	Angle (deg)	Radius (in)	Web	k Coef.	Hole Size (in)	Distance (in)
1	1.500	180.000	0.10700	Single	0.000	0.000	0.750
2	12.250	90.000	0.10700	Cee	0.000	0.000	6.125
3	1.500	0.000	0.10700	Single	0.000	0.000	0.750



Analysis Inputs

Members

	Section File	Revision Date and Time
1	1200T150-68.sct	1/1/2003 1:54:12 PM

	Start Loc. (ft)	End Loc. (ft)	Braced Flange	R	kϕ (lb)	Lm (ft)
1	0.0000	3.3300	Top	0.0000	0.0000	1.3300

	ex (in)	ey (in)
1	0.000	0.000

Supports

	Type	Location (ft)	Bearing (in)	Fastened	K
1	XYT	0.0000	2.00	Yes	1.0000
2	XYT	3.3300	2.00	Yes	1.0000

Loading: Dead Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	-90.000	0.0000	3.3300	60.000	60.000	lb/ft
2	Concentrated	-90.000	0.3300	NA	301.00	NA	lb
				Bearing Length		1.00	in
3	Concentrated	-90.000	1.6600	NA	301.00	NA	lb
				Bearing Length		1.00	in
4	Concentrated	-90.000	3.0000	NA	301.00	NA	lb
				Bearing Length		1.00	in

Loading: Live Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	-90.000	0.3300	NA	720.00	NA	lb
				Bearing Length		1.00	in
2	Concentrated	-90.000	1.6600	NA	720.00	NA	lb
				Bearing Length		1.00	in
3	Concentrated	-90.000	3.0000	NA	720.00	NA	lb
				Bearing Length		1.00	in

```
Load Combination: D+L
Specification:    2016 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Live Load                    1.000

Load Combination: Live Load Deflection
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Live Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D+0.75(Lr+S)+0.75*W pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Wmwf pos                     0.750
  4 Snow Load                    0.750

Load Combination: D+0.75(Lr+L)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Live Load                    0.750

Load Combination: D + Lr
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D + Wcc (Down)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wc&c pos                     1.000

Load Combination: 0.6D + Wcc (Uplift)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    0.600
  2 Wc&c neg                     1.000

Load Combination: D + Wmwf pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wmwf pos                     1.000
```

Member Check - 2016 North American Specification - US (ASD)

Load Combination: D+L
Design Parameters at 0.2883 ft:

Lx	3.3300 ft	Ly	3.3300 ft	Lt	3.3300 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000

Section: 1200T150-68.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi

Cbx	1.1989	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kφ	0 lb		
Red. Factor, R: 0		Lm	1.3300 ft		

Loads:	P (lb)	Mx (lb-in)	Vy (lb)	My (lb-in)	Vx (lb)
Total	0.0	5620	1615.6	0	0.0
Applied	0.0	5620	1615.6	0	0.0
Strength	3702.5	59533	2712.1	1746	3533.9

Effective section properties at applied loads:

Ae	1.06840 in^2	Ixe	18.149 in^4	Iye	0.128 in^4
		Sxe(t)	2.9632 in^3	Sye(l)	0.7139 in^3
		Sxe(b)	2.9632 in^3	Sye(r)	0.0967 in^3

Interaction Equations
NAS Eq. H1.2-1 (P, Mx, My) 0.000 + 0.094 + 0.000 = 0.094 <= 1.0
NAS Eq. H2-1 (Mx, Vy) Sqrt(0.009 + 0.355)= 0.603 <= 1.0
NAS Eq. H2-1 (My, Vx) Sqrt(0.000 + 0.000)= 0.000 <= 1.0

Maximum Shears, Moments, and Deflections

Load Combination: D+L, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.0000	0.0	1632.9	1632.9
3.3300	-1629.9	0.0	1629.9

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
1.6601	15113	1.6639	-0.0043316	

Maximum Shears, Moments, and Deflections

Load Combination: Live Load Deflection, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.0000	0.0	1081.1	1081.1
3.3300	-1078.9	0.0	1078.9

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
1.6601	9953.9	1.6638	-0.0028360	

Analysis: Unit Floor Rim-Header.cfsa ClarkDietrich Building Systems
Rim-Header, Unit Floor Joist ClarkDietrich Building Systems
200882 CFS-NHERI 10-Story Archetype
Rev. Date: 10/27/2021 10:08:45 AM
By: ClarkDietrich Building Systems
Printed: 10/27/2021 10:29:22 AM

Member Check - 2016 North American Specification - US (ASD)

Load Combination: D+L
Design Parameters at 1.6601 ft:

Lx	3.3300 ft	Ly	3.3300 ft	Lt	3.3300 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000

Section: 1200T150-68.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi

Cbx	1.1989	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kϕ	0 lb		
Red. Factor, R: 0		Lm	1.3300 ft		

Loads:	P (lb)	Mx (lb-in)	Vy (lb)	My (lb-in)	Vx (lb)
Total	0.0	15113	0.0	0	0.0
Applied	0.0	15113	0.0	0	0.0
Strength	3702.5	59533	2712.1	1746	3533.9

Effective section properties at applied loads:

Ae	1.06840 in^2	Ixe	18.149 in^4	Iye	0.128 in^4
		Sxe(t)	2.9632 in^3	Sye(l)	0.7139 in^3
		Sxe(b)	2.9632 in^3	Sye(r)	0.0967 in^3

Interaction Equations

NAS Eq. H1.2-1	(P, Mx, My)	0.000 + 0.254 + 0.000 = 0.254 <= 1.0
NAS Eq. H2-1	(Mx, Vy)	Sqrt(0.064 + 0.000)= 0.254 <= 1.0
NAS Eq. H2-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

Section: 1200S250-54.sct
1200S250-54, 50 ksi Stud
SSMA Library
Rev. Date: 1/22/2011 8:58:01 AM
By: RSG Software
Printed: 10/27/2021 3:09:40 PM

ClarkDietrich Building Systems
ClarkDietrich Building Systems

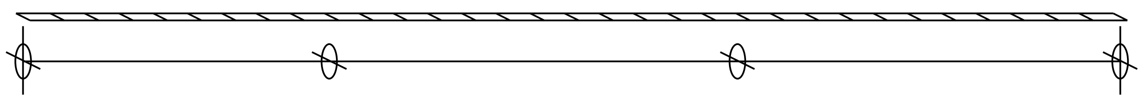
Section Inputs

```
Material: A653 SQ Grade 50/1
Apply strength increase from cold work of forming.
Modulus of Elasticity, E           29500 ksi
Yield Strength, Fy                    50 ksi
Tensile Strength, Fu                  65 ksi
Warping Constant Override, Cw          0 in^6
Torsion Constant Override, J           0 in^4
Net Section Ratio (Lnet/L)           0.1

Stud, Thickness 0.0566 in (16 Gage)
Placement of Part from Origin:
X to center of gravity           0 in
Y to center of gravity           0 in
Outside dimensions, Open shape
```

	Length (in)	Angle (deg)	Radius (in)	Web	k Coef.	Hole Size (in)	Distance (in)
1	0.625	270.000	0.084900	None	0.000	0.000	0.313
2	2.500	180.000	0.084900	Single	0.000	0.000	1.250
3	12.000	90.000	0.084900	Cee	0.000	1.500	6.000
4	2.500	0.000	0.084900	Single	0.000	0.000	1.250
5	0.625	-90.000	0.084900	None	0.000	0.000	0.313

Analysis: 21-6 Test Unit Roof Joist @ 16 OC.cfsa ClarkDietrich Building Systems
21-6 Roof Joist @ 16 OC ClarkDietrich Building Systems
200882 CFS-NHERI 10-Story Archetype
Rev. Date: 10/27/2021 3:08:14 PM
By: ClarkDietrich Building Systems
Printed: 10/27/2021 3:09:40 PM



Analysis Inputs

Members

	Section File	Revision Date and Time
1	1200S250-54.sct	1/22/2011 8:58:01 AM

	Start Loc. (ft)	End Loc. (ft)	Braced Flange	R	kϕ (lb)	Lm (ft)
1	0.000	21.500	Top	0.0000	0.0000	8.000

	ex (in)	ey (in)
1	0.000	0.000

Supports

	Type	Location (ft)	Bearing (in)	Fastened	K
1	XYT	0.000	2.00	Yes	1.0000
2	XT	6.000	1.00	No	1.0000
3	XT	14.000	1.00	No	1.0000
4	XYT	21.500	2.00	Yes	1.0000

Loading: Dead Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	270.000	0.000	21.500	32.000	32.000	lb/ft

Loading: Roof Live Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	270.000	0.000	21.500	27.000	27.000	lb/ft

Loading: Wmwf pos

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	270.000	0.000	21.500	1.330	1.330	lb/ft

Loading: Wmwf neg

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	90.000	0.000	21.500	37.440	37.440	lb/ft

Loading: Wc&c neg

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Distributed	90.000	0.000	7.000	68.450	68.450	lb/ft
2	Distributed	90.000	7.000	21.500	43.320	43.320	lb/ft

Load Combination: D+L
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Live Load	1.000

Load Combination: Live Load Deflection
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Live Load	1.000
2	Roof Live Load	1.000

Load Combination: D+0.75(Lr+S)+0.75*W pos
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Roof Live Load	0.750
3	Wmwf pos	0.750
4	Snow Load	0.750

Load Combination: D+0.75(Lr+L)
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Roof Live Load	0.750
3	Live Load	0.750

Load Combination: D + Lr
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Roof Live Load	1.000

Load Combination: D + Wcc (Down)
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Wc&c pos	1.000

Load Combination: 0.6D + Wmwf (Uplift)
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	0.600
2	Wmwf neg	1.000

Load Combination: D + Wmwf pos
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Wmwf pos	1.000

Member Check - 2016 North American Specification - US (ASD)

Load Combination: D + Lr
Design Parameters at 10.750 ft:

Lx	21.500 ft	Ly	8.000 ft	Lt	8.000 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000

Section: 1200S250-54.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi

Cbx	1.0209	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: Top		kϕ	0 lb		
Red. Factor, R: 0		Lm	8.000 ft		

Loads:	P (lb)	Mx (lb-in)	Vy (lb)	My (lb-in)	Vx (lb)
Total	0.0	40909	0.0	0	0.0
Applied	0.0	40909	0.0	0	0.0
Strength	4955.8	48042	1101.6	11145	4705.6

Effective section properties at applied loads:

Ae	0.95528 in^2	Ixe	19.189 in^4	Iye	0.670 in^4
		Sxe(t)	3.1125 in^3	Sye(l)	1.2388 in^3
		Sxe(b)	3.2887 in^3	Sye(r)	0.3419 in^3

Interaction Equations

NAS Eq. H1.2-1	(P, Mx, My)	0.000 + 0.852 + 0.000 = 0.852 <= 1.0
NAS Eq. H2-1	(Mx, Vy)	Sqrt(0.603 + 0.000)= 0.776 <= 1.0
NAS Eq. H2-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

Stud element 3 h/t exceeds 200.

Maximum Shears, Moments, and Deflections

Load Combination: D + Lr, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.000	0.00	634.25	634.25
21.500	-634.25	0.00	634.25

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
10.750	40909	10.750	-0.48855	

Maximum Shears, Moments, and Deflections

Load Combination: Live Load Deflection, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.000	0.00	290.25	290.25
21.500	-290.25	0.00	290.25

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
10.750	18721	10.750	-0.22357	

Maximum Shears, Moments, and Deflections

Load Combination: 0.6D + Wmwf (Uplift), Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.000	0.00	-196.08	-196.08
21.500	196.08	0.00	-196.08

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
10.750	-12647	10.750	0.15104	

Section: 1200T150-54.sct ClarkDietrich Building Systems
1200T150-54, 50 ksi Track ClarkDietrich Building Systems
SSMA Library
Rev. Date: 1/1/2003 1:54:12 PM
By: RSG Software
Printed: 10/27/2021 1:34:17 PM

Section Inputs

Material: A653 SQ Grade 50/1
Apply strength increase from cold work of forming.

Modulus of Elasticity, E	29500	ksi
Yield Strength, Fy	50	ksi
Tensile Strength, Fu	65	ksi
Warping Constant Override, Cw	0	in^6
Torsion Constant Override, J	0	in^4

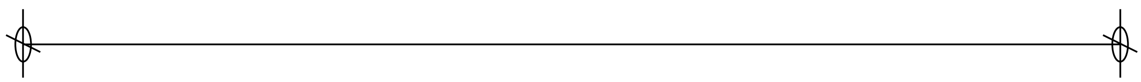
Track, Thickness 0.0566 in (16 Gage)
Placement of Part from Origin:

X to center of gravity	0	in
Y to center of gravity	0	in

Outside dimensions, Open shape

	Length (in)	Angle (deg)	Radius (in)	Web	k Coef.	Hole Size (in)	Distance (in)
1	1.500	180.000	0.084900	Single	0.000	0.000	0.750
2	12.198	90.000	0.084900	Cee	0.000	0.000	6.099
3	1.500	0.000	0.084900	Single	0.000	0.000	0.750

CFS Version 10.0.0
Analysis: Unit Roof Rim-Header.cfsa — ClarkDietrich Building Systems
Rim-Header, Unit Roof Joist — ClarkDietrich Building Systems
200882 CFS-NHERI 10-Story Archetype
Rev. Date: 10/27/2021 1:32:55 PM
By: ClarkDietrich Building Systems
Printed: 10/27/2021 1:34:17 PM



Analysis Inputs

Members

	Section File	Revision Date and Time
1	1200T150-54.sct	1/1/2003 1:54:12 PM

	Start Loc. (ft)	End Loc. (ft)	Braced Flange	R	kϕ (lb)	Lm (ft)
1	0.0000	3.3300	None	0.0000	0.0000	20.0000

	ex (in)	ey (in)
1	0.000	0.000

Supports

	Type	Location (ft)	Bearing (in)	Fastened	K
1	XYT	0.0000	2.00	Yes	1.0000
2	XYT	3.3300	2.00	Yes	1.0000

Loading: Dead Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	-90.000	0.3300	NA	344.00	NA	lb
				Bearing Length		1.00	in
2	Concentrated	-90.000	1.6600	NA	344.00	NA	lb
				Bearing Length		1.00	in
3	Concentrated	-90.000	3.0000	NA	344.00	NA	lb
				Bearing Length		1.00	in

Loading: Live Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	-90.000	0.3300	NA	290.00	NA	lb
				Bearing Length		1.00	in
2	Concentrated	-90.000	1.6600	NA	290.00	NA	lb
				Bearing Length		1.00	in
3	Concentrated	-90.000	3.0000	NA	290.00	NA	lb
				Bearing Length		1.00	in

```
Load Combination: D+L
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Live Load                    1.000

Load Combination: Live Load Deflection
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Live Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D+0.75(Lr+S)+0.75*W pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Wmwf pos                     0.750
  4 Snow Load                    0.750

Load Combination: D+0.75(Lr+L)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               0.750
  3 Live Load                    0.750

Load Combination: D + Lr
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Roof Live Load               1.000

Load Combination: D + Wcc (Down)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wc&c pos                     1.000

Load Combination: 0.6D + Wcc (Uplift)
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    0.600
  2 Wc&c neg                     1.000

Load Combination: D + Wmwf pos
Specification:    2012 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                     Factor
  1 Dead Load                    1.000
  2 Wmwf pos                     1.000
```

Member Check - 2012 North American Specification - US (ASD)

```
Load Combination: D+L
Design Parameters at 0.2883 ft:
Lx        3.3300 ft     Ly        3.3300 ft     Lt        3.3300 ft
Kx        1.0000        Ky        1.0000        Kt        1.0000

Section: 1200T150-54.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi
Cbx       1.2035        Cby       1.0000        ex        0.0000 in
Cmx       1.0000        Cmy       1.0000        ey        0.0000 in
Braced Flange: None     kφ             0 lb
Red. Factor, R: 0       Lm       20.0000 ft

Loads:            P          Mx          Vy          My          Vx
                (lb)     (lb-in)       (lb)     (lb-in)        (lb)
Total            0.0        3294      952.0           0         0.0
Applied          0.0        3294      952.0           0         0.0
Strength      3878.9       28903     1083.3        1011      2883.4

Effective section properties at applied loads:
Ae       0.84831 in^2   Ixe       14.378 in^4   Iye        0.103 in^4
                        Sxe(t)    2.3575 in^3   Sye(l)    0.5941 in^3
                        Sxe(b)    2.3575 in^3   Sye(r)    0.0774 in^3

Interaction Equations
NAS Eq. C5.2.1-1  (P, Mx, My)  0.000 + 0.114 + 0.000 = 0.114 <= 1.0
NAS Eq. C5.2.1-2  (P, Mx, My)  0.000 + 0.114 + 0.000 = 0.114 <= 1.0
NAS Eq. C3.3.1-1     (Mx, Vy)     Sqrt(0.010 + 0.772)= 0.884 <= 1.0
NAS Eq. C3.3.1-1     (My, Vx)     Sqrt(0.000 + 0.000)= 0.000 <= 1.0

Track element 2 h/t exceeds 200.
```

Member Check - 2012 North American Specification - US (ASD)

```
Load Combination: D+L
Design Parameters at 1.6601 ft:
Lx        3.3300 ft     Ly        3.3300 ft     Lt        3.3300 ft
Kx        1.0000        Ky        1.0000        Kt        1.0000

Section: 1200T150-54.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi
Cbx       1.2035        Cby       1.0000        ex        0.0000 in
Cmx       1.0000        Cmy       1.0000        ey        0.0000 in
Braced Flange: None     kφ             0 lb
Red. Factor, R: 0       Lm       20.0000 ft

Loads:            P          Mx          Vy          My          Vx
                (lb)     (lb-in)       (lb)     (lb-in)        (lb)
Total            0.0        8765        0.0           0         0.0
Applied          0.0        8765        0.0           0         0.0
Strength      3878.9       28903     1083.3        1011      2883.4
```

Effective section properties at applied loads:

Ae	0.84831 in^2	Ixe	14.378 in^4	Iye	0.103 in^4
		Sxe(t)	2.3575 in^3	Sye(l)	0.5941 in^3
		Sxe(b)	2.3575 in^3	Sye(r)	0.0774 in^3

Interaction Equations

```
NAS Eq. C5.2.1-1  (P, Mx, My)  0.000 + 0.303 + 0.000 = 0.303 <= 1.0
NAS Eq. C5.2.1-2  (P, Mx, My)  0.000 + 0.303 + 0.000 = 0.303 <= 1.0
NAS Eq. C3.3.1-1     (Mx, Vy)     Sqrt(0.071 + 0.000)= 0.267 <= 1.0
NAS Eq. C3.3.1-1     (My, Vx)     Sqrt(0.000 + 0.000)= 0.000 <= 1.0
```

Track element 2 h/t exceeds 200.

Maximum Shears, Moments, and Deflections

Load Combination: D+L, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.0000	0.00	951.95	951.95
3.3300	-950.05	0.00	950.05

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
1.6601	8765.0	1.6638	-0.0031521	

Maximum Shears, Moments, and Deflections

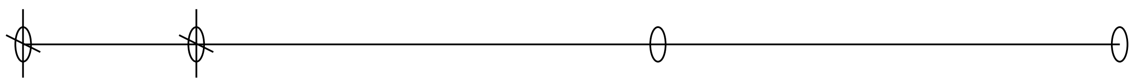
Load Combination: Live Load Deflection, Y Direction

Location (ft)	Shear(l) (lb)	Shear(r) (lb)	Reaction (lb)
0.0000	0.00	435.44	435.44
3.3300	-434.56	0.00	434.56

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
1.6601	4009.2	1.6638	-0.0014418	

Analysis: Guardrail Stud.cfsa
Guardrail Stud
CFS-NHERI
Rev. Date: 10/26/2021 1:21:07 PM
By: ClarkDietrich Building Systems
Printed: 10/26/2021 1:22:14 PM

ClarkDietrich Building Systems
ClarkDietrich Building Systems



Analysis Inputs

Members

	Section File	Revision Date and Time
1	600S250-68.sct	1/22/2011 8:58:01 AM

	Start Loc. (ft)	End Loc. (ft)	Braced Flange	R	kϕ (lb)	Lm (ft)
1	0.0000	4.7500	None	0.0000	0.0000	2.0000

	ex (in)	ey (in)
1	0.000	0.000

Supports

	Type	Location (ft)	Bearing (in)	Fastened	K
1	XYT	0.0000	1.00	Yes	1.0000
2	XYT	0.7500	1.00	Yes	1.0000
3	T	2.7500	1.00	No	1.0000
4	T	4.7500	1.00	No	1.0000

Loading: Dead Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Axial	NA	0.0000	4.5000	100.00	100.00	lb

Loading: Product Load

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	0.000	4.5000	NA	200.00	NA	lb
				Bearing Length		5.00	in

Loading: Wind MWFRS

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	0.000	2.7500	NA	30.00	NA	lb
				Bearing Length		5.00	in
2	Concentrated	0.000	4.5000	NA	30.00	NA	lb
				Bearing Length		5.00	in

Loading: Wind C&C

	Type	Angle (deg)	Start Loc. (ft)	End Loc. (ft)	Start Magnitude	End Magnitude	
1	Concentrated	0.000	2.7500	NA	50.00	NA	lb
				Bearing Length		5.00	in
2	Concentrated	0.000	4.5000	NA	50.00	NA	lb
				Bearing Length		5.00	in

Load Combination: D+L
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Live Load	1.000
3	Product Load	1.000

Load Combination: D+Lr
Specification: 2007 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Roof Live Load	1.000

Load Combination: D+S
Specification: 2007 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Snow Load	1.000

Load Combination: D+0.75(L+Lr)
Specification: 2007 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Live Load	0.750
3	Product Load	0.750
4	Roof Live Load	0.750

Load Combination: D+0.75(L+S)
Specification: 2007 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Live Load	0.750
3	Product Load	0.750
4	Snow Load	0.750

Load Combination: D+W
Specification: 2016 North American Specification - US (ASD)
Inflection Point Bracing: No

	Loading	Factor
1	Dead Load	1.000
2	Wind MWFRS	1.000
3	Product Load	1.000

```
Load Combination: 0.6D+W
Specification:    2007 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                        Factor
  1 Dead Load                       0.600
  2 Wind MWFRS                      1.000

Load Combination: Wind C&C
Specification:    2007 North American Specification - US (ASD)
Inflection Point Bracing: No
    Loading                        Factor
  1 Wind C&C                        1.000
```

Member Check - 2016 North American Specification - US (ASD)

```
Load Combination: D+W
Design Parameters at 0.7500 ft, Right side:
Lx        4.0000 ft     Ly        4.0000 ft     Lt        2.0000 ft
Kx        2.0000        Ky        2.0000        Kt        1.0000

Section: 600S250-68.sct
Material Type: A653 SQ Grade 50/1, Fy=50 ksi
Cbx       1.0000        Cby       1.6667        ex        0.0000 in
Cmx       1.0000        Cmy       1.0000        ey        0.0000 in
Braced Flange: None     kϕ             0 lb
Red. Factor, R: 0       Lm        2.0000 ft

Loads:           P          Mx          Vy          My          Vx
               (lb)     (lb-in)        (lb)     (lb-in)        (lb)
Total         100.0           0         0.0       11070      -260.0
Applied       100.0           0         0.0       11070      -260.0
Strength     7708.6       38582      2879.7       13373      5730.9

Effective section properties at applied loads:
Ae       0.83563 in^2   Ixe       4.7279 in^4   Iye       0.6889 in^4
                        Sxe(t)    1.5760 in^3   Sye(l)    0.9090 in^3
                        Sxe(b)    1.5760 in^3   Sye(r)    0.3954 in^3

Interaction Equations
NAS Eq. H1.2-1    (P, Mx, My)  0.013 + 0.000 + 0.828 = 0.841 <= 1.0
NAS Eq. H2-1         (Mx, Vy)     Sqrt(0.000 + 0.000)= 0.000 <= 1.0
NAS Eq. H2-1         (My, Vx)     Sqrt(0.685 + 0.002)= 0.829 <= 1.0
```

Maximum Shears, Moments, and Deflections

```
Load Combination: D+W, X Direction

   Location   Shear(l)   Shear(r)   Reaction
      (ft)       (lb)       (lb)       (lb)
    0.0000        0.0     1230.0     1230.0
    0.7500     1230.0     -260.0    -1490.0
```

Location (ft)	Moment (lb-in)	Location (ft)	Deflection (in)	Inflections (ft)
0.7500	11070	0.4330	-0.00283	
		4.7500	0.47367	

W1 EXTERIOR JOIST BEARING WALL

DESIGNED PER THE REQUIREMENTS OF AISI: 2016 NAS - US (ASD)

WALL NOTES

DEFAULT FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in
FLOOR FRAMING TYPE LEDGER FRAMED

DEFAULT WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	FLANGE BRACING		NONE
STUD DEPTH	6.000 in	BRACING	Ly =	4.00 ft
STUD OC SPACING	24 in		Lt =	4.00 ft

FOUNDATION LINE LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
SERVICE LEVEL LOADS	3758	4838	215	0	0	0	758

W1 EXTERIOR JOIST BEARING WALL, LEVEL 10

ROOF DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	ROOF	RIGHT LOADING TYPE	ROOF
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 10 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	44	0	0	0	0	0	0
	parapet						

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	258	0	215	0	0	0	52
CENTERLINE OF WALL (plf)	75	0	0	0	0	0	15
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	377	0	215	0	0	0	67
TOTAL AXIAL LOAD (lb)	753	0	430	0	0	0	134

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

ASD WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 37.60 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 10

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	S162	68 (50)

ASD LOAD COMBINATION	Axial	Ecc. Moment	ey	Wind	Vy,max	Unity	Mx,max	Unity
Wasd	lb	in-lb	in	plf	lb		ft-lb	
D + L	753	1548	2.056		0		0	
D + Lr	1183	2838	2.399		0		0	
D + 0.75L + 0.75Lr	1076	2516	2.339		0		0	
D + W	753	1548	2.056	37.60	188		470	
D + 0.7E	847	1767	2.086		0		0	
D + 0.75L + 0.75W + .75Lr	1076	2516	2.339	28.20	141		353	
D + 0.75L + 0.525E + .75Lr	1146	2679	2.338		0		0	
0.6D + W	452	929	2.056	37.60	188		470	
0.6D - 0.7E	358	710	1.985		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

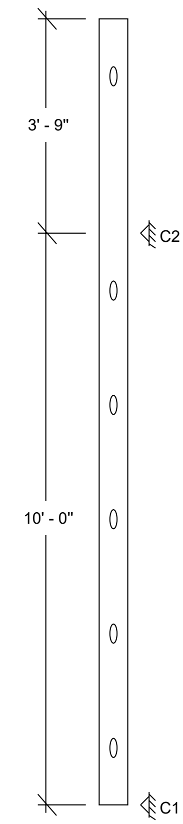
SERVICEABILITY	Wind	Vy,max	Mx,max	DEFLECTION		Unity
	plf	lb	ft-lb			
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 7
Prb = 83 lb
y Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:11 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Continuous:	Yes		
Parapet Porosity:	Porous	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:

Parapet Suction:	-43.27 psf
Parapet Pressure:	73.86 psf
Span Suction:	-22.91 psf
Span 1 Pressure:	22.41 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-1183.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-1183.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-2838 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-2838 lb-in ↻	NA	NA

Specified Member

(1) 600S162-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-13259 lb-in	39839 lb-in	33.28%	9.50 ft	TP / OH	Pass
Moment: Stability	-13259 lb-in	30864 lb-in	42.96%	9.50 ft	TP / OH	Pass
Moment: Dist. Buckling	-13259 lb-in	32755 lb-in	40.48%	9.50 ft	TP / OH	Pass
Shear	554 lbs	2879 lbs	19.24%	10.00 ft	TP / OH	Pass
V/M Interaction	0.37	1	36.73%	10.00 ft	TP / OH	Pass
Axial Stability	-1183 lbs	7563 lbs	15.64%	0.00 ft	DL	Pass
P/M Interaction	0.60	1	59.93%	9.50 ft	TP / OH	Pass
Moment of Inertia	1.365 in^4	3.525 in^4	38.72%	13.75 ft	TP / OH	Pass
Span Deflection	0.063 in	0.333 in	L/1905	5.00 ft	TS	Pass
OH + Adj Span Δ	0.174 in	0.45 in	L/930	13.75 ft	TP / OH	Pass
Web Crippling	-221 lbs	1389 lbs	15.87%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -590.82 lbs	Rx = 905.57 lbs		Ry = 0 lbs

Reference Clip : W1: Level 10 - Test - C2 - typical

C1:	Wind:	Rx = -220.53 lbs	Rx = 168.72 lbs		Ry = 1183 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 56% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 10 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:11 PM		

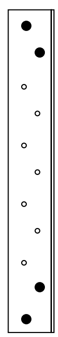
Inputs

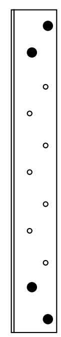
Connection Design:	Bypass	Clip:	**S681**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	68-50 L.S.F.	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	68-50	Clip Thickness	68 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	634 lbs
Tension:	591 lbs
Compression:	591 lbs

Clip Design





Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	634 lbs	8467 lbs	7%	Pass
Clip Strong Moment	634 lbs	38115 lbs	2%	Pass
Clip Weak Bending	591 lbs	932 lbs	63%	Pass
Clip Axial Stress	0.651	1	65%	Pass
Clip Axial Shear Stress	0.429	1	43%	Pass
Clip Weak-Axis Deflection	591 lbs	4338 lbs	14%	Pass
Screw Shear	163 lbs	667 lbs	24%	Pass
Screw Tension	148 lbs	926 lbs	16%	Pass
Screw Shear-Tension	0.31	1	31%	Pass
Tilting/Bearing	163 lbs	805 lbs	20%	Pass
Pullout	148 lbs	284 lbs	52%	Pass
Pullover	148 lbs	362 lbs	41%	Pass
Tilting-Pullout	0.385	1	39%	Pass
Bearing-Pullover	0.103	1	10%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	634 lbs	7842 lbs	8%	Pass
Clip Moment	634 lbs	38115 lbs	2%	Pass
Clip Compression	591 lbs	2038 lbs	29%	Pass
Clip Tension	591 lbs	15499 lbs	4%	Pass
Clip Compression Stress	0.307	1	31%	Pass
Clip Comp.-Shear Stress	0.101	1	10%	Pass
Screw Shear	238 lbs	667 lbs	36%	Pass
Tilting/Bearing	238 lbs	805 lbs	30%	Pass

Selected Clip: (1) S681 with (4) Buildex #12-14 to L.S.F. and (4) Buildex #12-14 to 68-50 L.S.F. - 65% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 9

10th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 9 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	527	0	215	0	0	0	106
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	752	538	215	0	0	0	152
TOTAL AXIAL LOAD (lb)	1505	1075	430	0	0	0	304

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 37.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 9

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	54 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	2580	4580	1.775		0		0	
D + Lr	1935	1355	0.700		0		0	
D + 0.75L + 0.75Lr	2633	3773	1.433		0		0	
D + W	1505	1355	0.900	37.00	185		463	
D + 0.7E	1717	1546	0.900		0		0	
D + 0.75L + 0.75W + .75Lr	2633	3773	1.433	27.75	139		347	
D + 0.75L + 0.525E + .75Lr	2793	3917	1.403		0		0	
0.6D + W	903	813	0.900	37.00	185		463	
0.6D - 0.7E	690	621	0.900		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 7
Prb = 195 lb
y Brdg Rows = 2

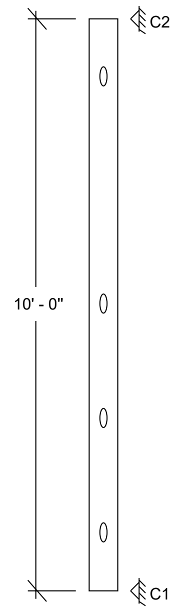
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:15 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-2)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span 1 Pressure: 22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-2793.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-2793.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S200-54 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	30397 lb-in	30.75%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	29636 lb-in	31.54%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	27389 lb-in	34.12%	6.00 ft	Suction	Pass
Shear	-267 lbs	1947 lbs	13.73%	0.00 ft	Suction	Pass
V/M Interaction	0.31	1	30.75%	6.00 ft	Suction	Pass
Axial Stability	-2793 lbs	7386 lbs	37.82%	0.00 ft	DL	Pass
P/M Interaction	0.75	1	74.70%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	3.319 in^4	30.86%	5.00 ft	Suction	Pass
Span Deflection	0.103 in	0.333 in	L/1167	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	930 lbs	28.73%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 09 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 2793 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 09 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:15 PM		

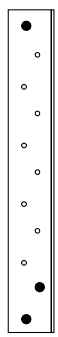
Inputs

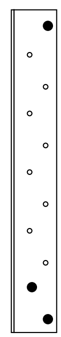
Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	54-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear: 1021 lbs
Tension: 262 lbs
Compression: 262 lbs

Clip Design





Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	262 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.541	1	54%	Pass
Clip Axial Shear Stress	0.321	1	32%	Pass
Clip Weak-Axis Deflection	262 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	87 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.691	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	87 lbs	198 lbs	44%	Pass
Pullover	87 lbs	287 lbs	30%	Pass
Tilting-Pullout	0.326	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	262 lbs	1262 lbs	21%	Pass
Clip Tension	262 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.252	1	25%	Pass
Clip Comp.-Shear Stress	0.095	1	10%	Pass
Screw Shear	387 lbs	467 lbs	83%	Pass
Tilting/Bearing	387 lbs	534 lbs	73%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 8

9th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 8 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	902	538	215	0	0	0	182
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1128	1075	215	0	0	0	228
TOTAL AXIAL LOAD (lb)	2256	2150	430	0	0	0	455

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 36.20 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 8

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	54 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	4406	4580	1.039		0		0	
D + Lr	2686	1355	0.504		0		0	
D + 0.75L + 0.75Lr	4191	3773	0.900		0		0	
D + W	2256	1355	0.600	36.20	181		453	
D + 0.7E	2575	1546	0.600		0		0	
D + 0.75L + 0.75W + .75Lr	4191	3773	0.900	27.15	136		339	
D + 0.75L + 0.525E + .75Lr	4430	3917	0.884		0		0	
0.6D + W	1354	813	0.600	36.20	181		453	
0.6D - 0.7E	1035	621	0.600		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

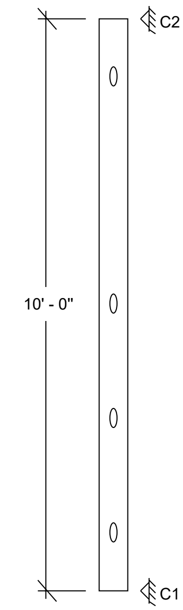
SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 266 lb
y Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:19 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-2)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span 1 Pressure: 22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-4430.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-4430.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in	NA	NA

Specified Member

(1) 600S300-54 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	33129 lb-in	28.21%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	33129 lb-in	28.21%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	29628 lb-in	31.54%	6.00 ft	Suction	Pass
Shear	-267 lbs	1947 lbs	13.73%	0.00 ft	Suction	Pass
V/M Interaction	0.28	1	28.21%	6.00 ft	Suction	Pass
Axial Stability	-4430 lbs	7866 lbs	56.32%	0.00 ft	DL	Pass
P/M Interaction	0.91	1	91.03%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	4.015 in^4	25.52%	5.00 ft	Suction	Pass
Span Deflection	0.085 in	0.333 in	L/1411	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	930 lbs	28.73%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 08 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 4430 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 08 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:19 PM		

Inputs

Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50 L.S.F.	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	54-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	534 lbs	73%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

ClarkDietrich ENGINEERING SERVICES
2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

W1 EXTERIOR JOIST BEARING WALL, LEVEL 7

8th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 7 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	1278	1075	215	0	0	0	258
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1504	1613	215	0	0	0	303
TOTAL AXIAL LOAD (lb)	3008	3225	430	0	0	0	607

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 7

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	68 (50)

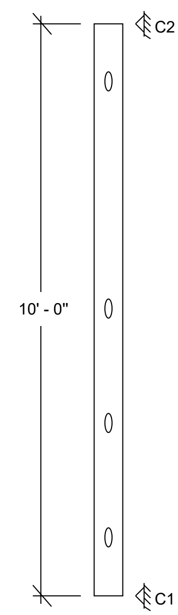
ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	6233	4580	0.735		0		0	
D + Lr	3438	1355	0.394		0		0	
D + 0.75L + 0.75Lr	5749	3773	0.656		0		0	
D + W	3008	1355	0.450	35.40	177		443	
D + 0.7E	3432	1546	0.450		0		0	
D + 0.75L + 0.75W + .75Lr	5749	3773	0.656	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	6067	3917	0.646		0		0	
0.6D + W	1805	813	0.450	35.40	177		443	
0.6D - 0.7E	1380	621	0.450		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 374 lb
y Brdg Rows = 2

DesignPro
Wall Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:24 PM		



Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:

Span Suction:	-22.91 psf
Span 1 Pressure:	22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-6233.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-6233.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S200-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	44384 lb-in	21.06%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	38793 lb-in	24.09%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	37000 lb-in	25.26%	6.00 ft	Suction	Pass
Shear	-267 lbs	2879 lbs	9.28%	0.00 ft	Suction	Pass
V/M Interaction	0.21	1	21.06%	6.00 ft	Suction	Pass
Axial Stability	-6233 lbs	9810 lbs	63.54%	0.00 ft	DL	Pass
P/M Interaction	0.93	1	92.75%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	4.101 in^4	24.98%	5.00 ft	Suction	Pass
Span Deflection	0.083 in	0.333 in	L/1441	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	1389 lbs	19.24%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 07 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 6233 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 07 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:24 PM		

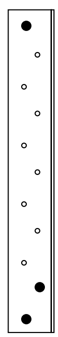
Inputs

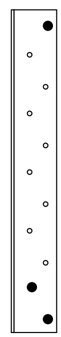
Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50 L.S.F.	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	68-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design





Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 6

7th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 6 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	1654	1613	215	0	0	0	334
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1880	2150	215	0	0	0	379
TOTAL AXIAL LOAD (lb)	3759	4300	430	0	0	0	758

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 6

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	68 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	8059	4580	0.568		0		0	
D + Lr	4189	1355	0.323		0		0	
D + 0.75L + 0.75Lr	7307	3773	0.516		0		0	
D + W	3759	1355	0.360	35.40	177		443	
D + 0.7E	4290	1546	0.360		0		0	
D + 0.75L + 0.75W + .75Lr	7307	3773	0.516	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	7705	3917	0.508		0		0	
0.6D + W	2255	813	0.360	35.40	177		443	
0.6D - 0.7E	1725	621	0.360		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 484 lb
y Brdg Rows = 2

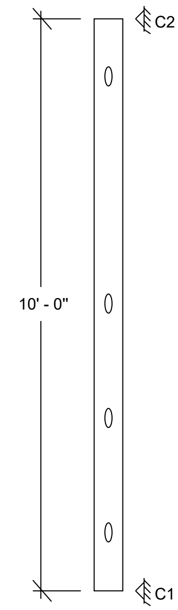
DesignPro
Wall Designer Output

Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:26 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span 1 Pressure: 22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-8059.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-8059.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S300-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	43300 lb-in	21.58%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	43300 lb-in	21.58%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	40535 lb-in	23.06%	6.00 ft	Suction	Pass
Shear	-267 lbs	2879 lbs	9.28%	0.00 ft	Suction	Pass
V/M Interaction	0.22	1	21.59%	6.00 ft	Suction	Pass
Axial Stability	-8059 lbs	11017 lbs	73.15%	0.00 ft	DL	Pass
P/M Interaction	1.00	1	99.77%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	5.222 in^4	19.62%	5.00 ft	Suction	Pass
Span Deflection	0.065 in	0.333 in	L/1835	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	1389 lbs	19.24%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 06 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 8059 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 06 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:26 PM		

Inputs

Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	68-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 5

6th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 5 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2030	2150	215	0	0	0	409
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	2255	2688	215	0	0	0	455
TOTAL AXIAL LOAD (lb)	4511	5375	430	0	0	0	910

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 5

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	S200	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	9886	4580	0.463		0		0	
D + Lr	4941	1355	0.274		0		0	
D + 0.75L + 0.75Lr	8864	3773	0.426		0		0	
D + W	4511	1355	0.300	35.40	177		443	
D + 0.7E	5148	1546	0.300		0		0	
D + 0.75L + 0.75W + .75Lr	8864	3773	0.426	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	9342	3917	0.419		0		0	
0.6D + W	2706	813	0.300	35.40	177		443	
0.6D - 0.7E	2069	621	0.300		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

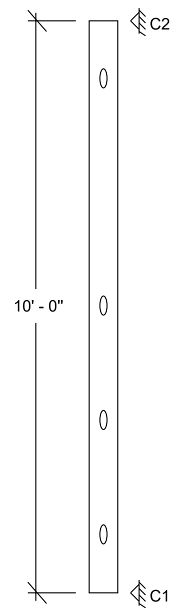
SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 593 lb
y Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:14 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-19018.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S350-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	77650 lb-in	4.42%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	77650 lb-in	4.42%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	78371 lb-in	4.38%	9.66 ft	Custom	Pass
Shear	-81 lbs	3805 lbs	2.14%	10.00 ft	Custom	Pass
V/M Interaction	0.05	1	4.87%	9.66 ft	Custom	Pass
Axial Stability	-19018 lbs	23364 lbs	81.40%	0.00 ft	DL	Pass
P/M Interaction	0.87	1	86.90%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	8.632 in^4	1.07%	7.00 ft	Custom	Pass
Span Deflection	0.005 in	0.5 in	L/22359	7.00 ft	Custom	Pass
Web Crippling	81 lbs	2572 lbs	3.16%	C2	Custom	Pass
Web Crippling	19 lbs	2572 lbs	0.73%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 19018 lbs

600T125-97 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

W1 EXTERIOR JOIST BEARING WALL, LEVEL 4

5th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 4 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2405	2688	215	0	0	0	485
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	2631	3225	215	0	0	0	531
TOTAL AXIAL LOAD (lb)	5262	6450	430	0	0	0	1062

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 4

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	11712	4580	0.391		0		0	
D + Lr	5692	1355	0.238		0		0	
D + 0.75L + 0.75Lr	10422	3773	0.362		0		0	
D + W	5262	1355	0.257	35.40	177		443	
D + 0.7E	6005	1546	0.257		0		0	
D + 0.75L + 0.75W + .75Lr	10422	3773	0.362	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	10979	3917	0.357		0		0	
0.6D + W	3157	813	0.257	35.40	177		443	
0.6D - 0.7E	2414	621	0.257		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

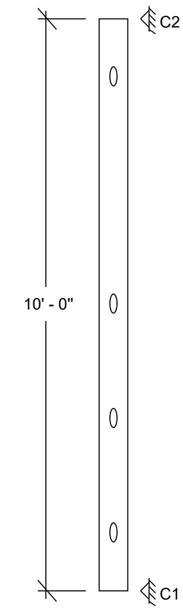
SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 703 lb
y Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:33 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:

Span Suction:	-22.91 psf
Span 1 Pressure:	22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-11712.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-11712.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S200-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	64543 lb-in	14.48%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	53868 lb-in	17.35%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	56022 lb-in	16.68%	6.00 ft	Suction	Pass
Shear	-267 lbs	3805 lbs	7.02%	0.00 ft	Suction	Pass
V/M Interaction	0.14	1	14.48%	6.00 ft	Suction	Pass
Axial Stability	-11712 lbs	15302 lbs	76.54%	0.00 ft	DL	Pass
P/M Interaction	0.98	1	97.85%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	5.613 in^4	18.25%	5.00 ft	Suction	Pass
Span Deflection	0.061 in	0.333 in	L/1972	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	2197 lbs	12.17%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 04 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 11712 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 04 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:33 PM		

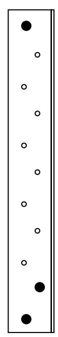
Inputs

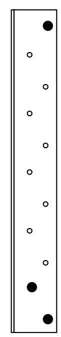
Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	97-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design





Support Leg Design Results

Wind Pressure Reactions

Interaction Check	**Actual**	**Allowable**	**Capacity**	**P/F**
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	**Actual**	**Allowable**	**Capacity**	**P/F**
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 3

4th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 3 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2781	3225	215	0	0	0	561
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3007	3763	215	0	0	0	607
TOTAL AXIAL LOAD (lb)	6014	7525	430	0	0	0	1213

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

PROJECT NAME:	CFS-NHERI 10 Story Test Portion
PROJECT NUMBER:	2150200882
ENGINEER:	L. Padgett
DATE:	10/29/2021
CHECKER:	LAP
DATE:	
SUBJECT:	W1 EXTERIOR JOIST BEARING WALL

ClarkDietrich ENGINEERING SERVICES
2262 Rutherford Road, Suite 104 **Phone: (877) 832-3206**
Carlsbad, California 92008 **www.ClarkDietrich.com**

W1 EXTERIOR JOIST BEARING WALL, LEVEL 3

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S250	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	13539	4580	0.338		0		0	
D + Lr	6444	1355	0.210		0		0	
D + 0.75L + 0.75Lr	11980	3773	0.315		0		0	
D + W	6014	1355	0.225	35.40	177		443	
D + 0.7E	6863	1546	0.225		0		0	
D + 0.75L + 0.75W + .75Lr	11980	3773	0.315	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	12617	3917	0.310		0		0	
0.6D + W	3608	813	0.225	35.40	177		443	
0.6D - 0.7E	2759	621	0.225		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 812 lb
y Brdg Rows = 2

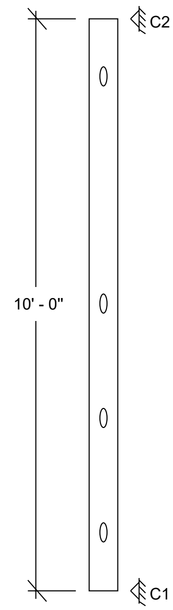
DesignPro
Wall Designer Output

Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:47 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:

Span Suction:	-22.91 psf
Span 1 Pressure:	22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-13539.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-13539.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S250-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	69935 lb-in	13.36%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	62257 lb-in	15.01%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	61581 lb-in	15.18%	6.00 ft	Suction	Pass
Shear	-267 lbs	3805 lbs	7.02%	0.00 ft	Suction	Pass
V/M Interaction	0.13	1	13.37%	6.00 ft	Suction	Pass
Axial Stability	-13539 lbs	17754 lbs	76.26%	0.00 ft	DL	Pass
P/M Interaction	0.95	1	94.89%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	6.497 in^4	15.77%	5.00 ft	Suction	Pass
Span Deflection	0.053 in	0.333 in	L/2283	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	2197 lbs	12.17%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 03 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 13539 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 03 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:47 PM		

Inputs

Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	97-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 2

3rd FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 2 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	3157	3763	215	0	0	0	637
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3383	4300	215	0	0	0	682
TOTAL AXIAL LOAD (lb)	6765	8600	430	0	0	0	1365

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 2

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	15365	4580	0.298		0		0	
D + Lr	7195	1355	0.188		0		0	
D + 0.75L + 0.75Lr	13538	3773	0.279		0		0	
D + W	6765	1355	0.200	35.40	177		443	
D + 0.7E	7720	1546	0.200		0		0	
D + 0.75L + 0.75W + .75Lr	13538	3773	0.279	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	14254	3917	0.275		0		0	
0.6D + W	4059	813	0.200	35.40	177		443	
0.6D - 0.7E	3104	621	0.200		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 922 lb
y Brdg Rows = 2

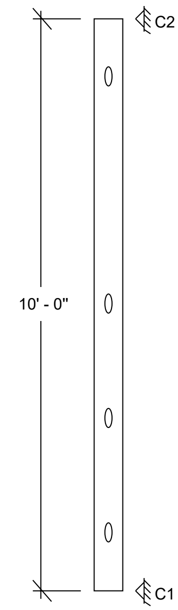
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:50 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:

Span Suction:	-22.91 psf
Span 1 Pressure:	22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-15365.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-15365.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S300-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	67292 lb-in	13.89%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	67292 lb-in	13.89%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	64684 lb-in	14.45%	6.00 ft	Suction	Pass
Shear	-267 lbs	3805 lbs	7.02%	0.00 ft	Suction	Pass
V/M Interaction	0.14	1	13.89%	6.00 ft	Suction	Pass
Axial Stability	-15365 lbs	18943 lbs	81.11%	0.00 ft	DL	Pass
P/M Interaction	0.99	1	98.85%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	7.281 in^4	14.07%	5.00 ft	Suction	Pass
Span Deflection	0.047 in	0.333 in	L/2559	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	2197 lbs	12.17%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 02 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 15365 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 02 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:50 PM		

Inputs

Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	97-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	1021 lbs
Tension:	264 lbs
Compression:	264 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W1 EXTERIOR JOIST BEARING WALL, LEVEL 1

2nd FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 1 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	150.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	3533	4300	215	0	0	0	713
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3758	4838	215	0	0	0	758
TOTAL AXIAL LOAD (lb)	7517	9675	430	0	0	0	1517

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 35.40 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -30.25 plf

ZONE 5 P = -26.74 psf
w = -53.48 plf

W1 EXTERIOR JOIST BEARING WALL, LEVEL 1

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	17192	4580	0.266		0		0	
D + Lr	7947	1355	0.170		0		0	
D + 0.75L + 0.75Lr	15095	3773	0.250		0		0	
D + W	7517	1355	0.180	35.40	177		443	
D + 0.7E	8578	1546	0.180		0		0	
D + 0.75L + 0.75W + .75Lr	15095	3773	0.250	26.55	133		332	
D + 0.75L + 0.525E + .75Lr	15891	3917	0.246		0		0	
0.6D + W	4510	813	0.180	35.40	177		443	
0.6D - 0.7E	3448	621	0.180		0		0	
ZONE 4 BENDING				30.25	151		378	
ZONE 5 BENDING				53.48	267		668	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	21.18	106	265			
ZONE 5 DEFLECTION	37.43	187	468			

Brace Force (n studs) 6
Prb = 1031 lb
y Brdg Rows = 2

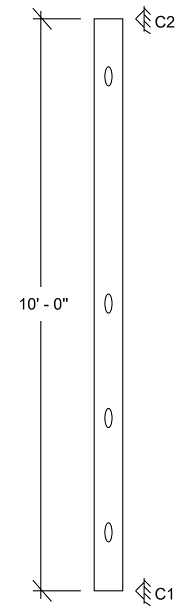
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W1: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:53 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/360
Design Option:	Typical	0.7 Deflection Used:	Yes
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft
Parapet Porosity:	NA	Under Hang Porosity:	NA



Wind Pressures

Typical Zone:

Span Suction:	-22.91 psf
Span 1 Pressure:	22.56 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Suction(typical)	Global FY	10.00 ft	-17192.00 lbs	NA	NA
Axial Point	Pressure	Global FY	10.00 ft	-17192.00 lbs	NA	NA
Moment	Suction(typical)	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA
Moment	Pressure	Global Mz	9.50 ft	-4580 lb-in ↻	NA	NA

Specified Member

(1) 600S350-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-9346 lb-in	77650 lb-in	12.04%	6.00 ft	Suction	Pass
Moment: Stability	-9346 lb-in	77650 lb-in	12.04%	6.00 ft	Suction	Pass
Moment: Dist. Buckling	-9346 lb-in	78371 lb-in	11.93%	6.00 ft	Suction	Pass
Shear	-267 lbs	3805 lbs	7.02%	0.00 ft	Suction	Pass
V/M Interaction	0.12	1	12.04%	6.00 ft	Suction	Pass
Axial Stability	-17192 lbs	23364 lbs	73.58%	0.00 ft	DL	Pass
P/M Interaction	0.88	1	88.21%	6.00 ft	Suction	Pass
Moment of Inertia	1.024 in^4	8.632 in^4	11.87%	5.00 ft	Suction	Pass
Span Deflection	0.04 in	0.333 in	L/3034	5.00 ft	Suction	Pass
Web Crippling	-267 lbs	2197 lbs	12.17%	C1	Suction	Pass

Specified Connections

C2:	Wind:	Rx = -190.93 lbs	Rx = 263.77 lbs		Ry = 0 lbs

Reference Clip : W1: Level 01 - Test - C2 - typical

C1:	Wind:	Rx = -267.27 lbs	Rx = 187.43 lbs		Ry = 17192 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 16" O.C. - 68% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	W1: Level 01 - Test - C2 - typical	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:53 PM		

Inputs

Connection Design:	Top	Clip:	**S541**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	54-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	97-50	Clip Thickness	54 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear: 1021 lbs
Tension: 264 lbs
Compression: 264 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5987 lbs	17%	Pass
Clip Strong Moment	1021 lbs	22767 lbs	4%	Pass
Clip Weak Bending	264 lbs	529 lbs	50%	Pass
Clip Axial Stress	0.544	1	54%	Pass
Clip Axial Shear Stress	0.325	1	33%	Pass
Clip Weak-Axis Deflection	264 lbs	2348 lbs	11%	Pass
Screw Shear	356 lbs	467 lbs	76%	Pass
Screw Tension	88 lbs	645 lbs	14%	Pass
Screw Shear-Tension	0.692	1	69%	Pass
Tilting/Bearing	356 lbs	534 lbs	67%	Pass
Pullout	88 lbs	198 lbs	44%	Pass
Pullover	88 lbs	287 lbs	31%	Pass
Tilting-Pullout	0.328	1	33%	Pass
Bearing-Pullover	0.077	1	8%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1021 lbs	5738 lbs	18%	Pass
Clip Moment	1021 lbs	22767 lbs	4%	Pass
Clip Compression	264 lbs	1262 lbs	21%	Pass
Clip Tension	264 lbs	12730 lbs	2%	Pass
Clip Compression Stress	0.254	1	25%	Pass
Clip Comp.-Shear Stress	0.096	1	10%	Pass
Screw Shear	388 lbs	467 lbs	83%	Pass
Tilting/Bearing	388 lbs	629 lbs	62%	Pass

Selected Clip: (1) S541 with (3) Buildex #10-16 T3 to L.S.F. and (3) Buildex #10-16 T3 to 54-50 L.S.F. - 83% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

W3 DEMISING BEARING WALL

DESIGNED PER THE REQUIREMENTS OF AISI: 2016 NAS - US (ASD)

WALL NOTES

GL C, D, E, & F

DEFAULT FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in
FLOOR FRAMING TYPE LEDGER FRAMED

DEFAULT WALL DETAILS

WALL TYPE	INTERIOR WALL	FLANGE BRACING		NONE
STUD DEPTH	6.000 in	BRACING	Ly =	4.00 ft
STUD OC SPACING	24 in		Lt =	4.00 ft

FOUNDATION LINE LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
SERVICE LEVEL LOADS	1376	599	27	0	0	0	278

W3 DEMISING BEARING WALL, LEVEL 10

ROOF DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	ROOF	RIGHT LOADING TYPE	ROOF
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 10 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	16	0	13	0	0	0	3
CENTERLINE OF WALL (plf)	58	0	0	0	0	0	12
RIGHT SIDE OF WALL (plf)	16	0	13	0	0	0	3
TOTAL LINE LOAD (plf)	89	0	27	0	0	0	18
TOTAL AXIAL LOAD (lb)	179	0	53	0	0	0	36

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 10

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity	Mx,max ft-lb	Unity
D + L	179	0	0.000	10.00	50		125	
D + Lr	232	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	219	0	0.000	10.00	50		125	
D + W	179	0	0.000	10.00	50		125	
D + 0.7E	204	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	219	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	238	0	0.000	10.00	50		125	
0.6D + W	107	0	0.000	10.00	50		125	
0.6D - 0.7E	82	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 24 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 9

10th FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 9 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	204	0	27	0	0	0	41
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	232	67	27	0	0	0	47
TOTAL AXIAL LOAD (lb)	465	133	53	0	0	0	94

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 9

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	S162	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	598	0	0.000	10.00	50		125	
D + Lr	518	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	604	0	0.000	10.00	50		125	
D + W	465	0	0.000	10.00	50		125	
D + 0.7E	530	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	604	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	654	0	0.000	10.00	50		125	
0.6D + W	279	0	0.000	10.00	50		125	
0.6D - 0.7E	213	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 65 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 8

9th FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 8 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	347	67	27	0	0	0	70
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	375	133	27	0	0	0	76
TOTAL AXIAL LOAD (lb)	751	266	53	0	0	0	151

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 8

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	1017	0	0.000	10.00	50		125	
D + Lr	804	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	990	0	0.000	10.00	50		125	
D + W	751	0	0.000	10.00	50		125	
D + 0.7E	857	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	990	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	1069	0	0.000	10.00	50		125	
0.6D + W	450	0	0.000	10.00	50		125	
0.6D - 0.7E	344	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 107 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 7

8th FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 7 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	490	133	27	0	0	0	99
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	518	200	27	0	0	0	105
TOTAL AXIAL LOAD (lb)	1036	399	53	0	0	0	209

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 7

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	1435	0	0.000	10.00	50		125	
D + Lr	1090	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	1376	0	0.000	10.00	50		125	
D + W	1036	0	0.000	10.00	50		125	
D + 0.7E	1183	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	1376	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	1485	0	0.000	10.00	50		125	
0.6D + W	622	0	0.000	10.00	50		125	
0.6D - 0.7E	475	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 149 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 6

7th FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 6 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	633	200	27	0	0	0	128
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	661	266	27	0	0	0	133
TOTAL AXIAL LOAD (lb)	1322	532	53	0	0	0	267

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 6

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	1854	0	0.000	10.00	50		125	
D + Lr	1375	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	1761	0	0.000	10.00	50		125	
D + W	1322	0	0.000	10.00	50		125	
D + 0.7E	1509	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	1761	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	1901	0	0.000	10.00	50		125	
0.6D + W	793	0	0.000	10.00	50		125	
0.6D - 0.7E	607	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 190 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 5

6th FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 5 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	776	266	27	0	0	0	157
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	804	333	27	0	0	0	162
TOTAL AXIAL LOAD (lb)	1608	665	53	0	0	0	324

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 5

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	2273	0	0.000	10.00	50		125	
D + Lr	1661	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	2147	0	0.000	10.00	50		125	
D + W	1608	0	0.000	10.00	50		125	
D + 0.7E	1835	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	2147	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	2317	0	0.000	10.00	50		125	
0.6D + W	965	0	0.000	10.00	50		125	
0.6D - 0.7E	738	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 232 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 4

5th FLOOR DETAILS

LEFT SPAN LENGTH 1.33 ft
LEFT LOADING TYPE UNIT
SPAN TYPE SIMPLE SPAN
LINE LOAD MODIFIER 1.00

RIGHT SPAN 1.33 ft
RIGHT LOADING TYPE UNIT
SPAN TYPE SIMPLE SPAN
LINE LOAD MODIFIER 1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 4 WALL DETAILS

WALL TYPE INTERIOR WALL
STORY HEIGHT 10.00 ft
WALL DL 115.0 plf
DEFLECTION LIMIT L / 240

DEPTH 6.000 in
STUD OC SPACING: 24 in
OC LOAD FACTOR 2.000

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	919	333	27	0	0	0	185
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	947	399	27	0	0	0	191
TOTAL AXIAL LOAD (lb)	1894	798	53	0	0	0	382

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

W3 DEMISING BEARING WALL, LEVEL 4

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	2692	0	0.000	10.00	50		125	
D + Lr	1947	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	2532	0	0.000	10.00	50		125	
D + W	1894	0	0.000	10.00	50		125	
D + 0.7E	2161	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	2532	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	2733	0	0.000	10.00	50		125	
0.6D + W	1136	0	0.000	10.00	50		125	
0.6D - 0.7E	869	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 273 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 3

4th FLOOR DETAILS

LEFT SPAN LENGTH 1.33 ft
LEFT LOADING TYPE UNIT
SPAN TYPE SIMPLE SPAN
LINE LOAD MODIFIER 1.00

RIGHT SPAN 1.33 ft
RIGHT LOADING TYPE UNIT
SPAN TYPE SIMPLE SPAN
LINE LOAD MODIFIER 1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 3 WALL DETAILS

WALL TYPE INTERIOR WALL
STORY HEIGHT 10.00 ft
WALL DL 115.0 plf
DEFLECTION LIMIT L / 240

DEPTH 6.000 in
STUD OC SPACING: 24 in
OC LOAD FACTOR 2.000

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	1062	399	27	0	0	0	214
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	1090	466	27	0	0	0	220
TOTAL AXIAL LOAD (lb)	2180	931	53	0	0	0	440

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 3

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	**600**	**S162**	**54 (50)**

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	3111	0	0.000	10.00	50		125	
D + Lr	2233	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	2918	0	0.000	10.00	50		125	
D + W	2180	0	0.000	10.00	50		125	
D + 0.7E	2488	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	2918	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	3149	0	0.000	10.00	50		125	
0.6D + W	1308	0	0.000	10.00	50		125	
0.6D - 0.7E	1000	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 315 lb
Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 2

3rd FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 2 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	1205	466	27	0	0	0	243
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	1233	532	27	0	0	0	249
TOTAL AXIAL LOAD (lb)	2466	1064	53	0	0	0	497

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W3 DEMISING BEARING WALL, LEVEL 2

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft

Ly = 4.00 ft

Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	3530	0	0.000	10.00	50		125	
D + Lr	2519	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	3304	0	0.000	10.00	50		125	
D + W	2466	0	0.000	10.00	50		125	
D + 0.7E	2814	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	3304	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	3565	0	0.000	10.00	50		125	
0.6D + W	1479	0	0.000	10.00	50		125	
0.6D - 0.7E	1131	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10

Prb = 356 lb

Brdg Rows = 2

W3 DEMISING BEARING WALL, LEVEL 1

2nd FLOOR DETAILS

LEFT SPAN LENGTH	1.33 ft	RIGHT SPAN	1.33 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 1 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	14	33	0	0	0	0	3
CENTERLINE OF WALL (plf)	1348	532	27	0	0	0	272
RIGHT SIDE OF WALL (plf)	14	33	0	0	0	0	3
TOTAL LINE LOAD (plf)	1376	599	27	0	0	0	278
TOTAL AXIAL LOAD (lb)	2752	1197	53	0	0	0	555

*ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT

W3 DEMISING BEARING WALL, LEVEL 1

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	3949	0	0.000	10.00	50		125	
D + Lr	2805	0	0.000	10.00	50		125	
D + 0.75L + 0.75Lr	3689	0	0.000	10.00	50		125	
D + W	2752	0	0.000	10.00	50		125	
D + 0.7E	3140	0	0.000	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	3689	0	0.000	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	3981	0	0.000	10.00	50		125	
0.6D + W	1651	0	0.000	10.00	50		125	
0.6D - 0.7E	1262	0	0.000	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 10
Prb = 398 lb
Brdg Rows = 2

W5 CORRIDOR BEARING WALL

DESIGNED PER THE REQUIREMENTS OF AISI: 2016 NAS - US (ASD)

WALL NOTES

Need 50plf at top of wall, corridor flange to simulate the corridor joist DL.

DEFAULT FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00
FLOOR SYSTEM DEPTH	12 in		
FLOOR FRAMING TYPE	LEDGER FRAMED		

DEFAULT WALL DETAILS

WALL TYPE	INTERIOR WALL	FLANGE BRACING		NONE
STUD DEPTH	6.000 in	BRACING	Ly =	4.00 ft
STUD OC SPACING	24 in		Lt =	4.00 ft

FOUNDATION LINE LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
SERVICE LEVEL LOADS	3862	5648	260	0	0	0	779

W5 CORRIDOR BEARING WALL, LEVEL 10

ROOF DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	ROOF	RIGHT LOADING TYPE	ROOF
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 10 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	54	0	45	0	0	0	11
CENTERLINE OF WALL (plf)	58	0	0	0	0	0	12
RIGHT SIDE OF WALL (plf)	258	0	215	0	0	0	52
TOTAL LINE LOAD (plf)	370	0	260	0	0	0	75
TOTAL AXIAL LOAD (lb)	739	0	520	0	0	0	149

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 10

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1		600	S162	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity	Mx,max ft-lb	Unity
D + L	739	1224	1.656	10.00	50		125	
D + Lr	1259	2244	1.782	10.00	50		125	
D + 0.75L + 0.75Lr	1129	1989	1.762	10.00	50		125	
D + W	739	1224	1.656	10.00	50		125	
D + 0.7E	843	1397	1.656	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	1129	1989	1.762	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	1207	2119	1.755	10.00	50		125	
0.6D + W	443	734	1.656	10.00	50		125	
0.6D - 0.7E	339	562	1.656	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	10.00	50	125			

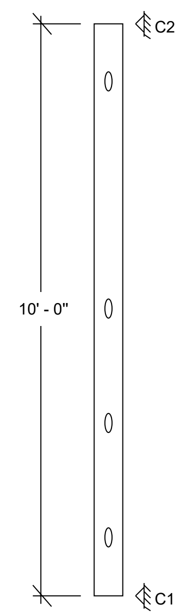
Brace Force (n studs) 17
Prb = 214 lb
Brdg Rows = 2

DesignPro
Wall Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 4:59 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-1259.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-2244 lb-in ↻	NA	NA

Specified Member

(1) 600S162-43 33 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-1971 lb-in	16781 lb-in	11.74%	9.66 ft	Custom	Pass
Moment: Stability	-1971 lb-in	14623 lb-in	13.48%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-1971 lb-in	13562 lb-in	14.53%	9.66 ft	Custom	Pass
Shear	-69 lbs	1240 lbs	5.54%	10.00 ft	Custom	Pass
V/M Interaction	0.13	1	12.87%	9.66 ft	Custom	Pass
Axial Stability	-1259 lbs	3522 lbs	35.74%	0.00 ft	DL	Pass
P/M Interaction	0.51	1	51.01%	9.66 ft	Custom	Pass
Moment of Inertia	0.025 in^4	2.316 in^4	1.07%	3.00 ft	Custom	Pass
Span Deflection	0.005 in	0.5 in	L/22469	3.00 ft	Custom	Pass
Web Crippling	69 lbs	410 lbs	16.75%	C2	Custom	Pass
Web Crippling	31 lbs	410 lbs	7.63%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 68.7 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 17% Capacity

C1:	Wind:	Rx = 31.3 lbs			Ry = 1259 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 8% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 9

10th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 9 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	485	0	260	0	0	0	98
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	758	628	260	0	0	0	153
TOTAL AXIAL LOAD (lb)	1515	1255	520	0	0	0	306

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 9

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	2770	3756	1.356	10.00	50		125	
D + Lr	2035	1071	0.526	10.00	50		125	
D + 0.75L + 0.75Lr	2846	3085	1.084	10.00	50		125	
D + W	1515	1071	0.707	10.00	50		125	
D + 0.7E	1729	1222	0.707	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	2846	3085	1.084	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	3007	3198	1.064	10.00	50		125	
0.6D + W	909	643	0.707	10.00	50		125	
0.6D - 0.7E	695	491	0.707	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 180 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

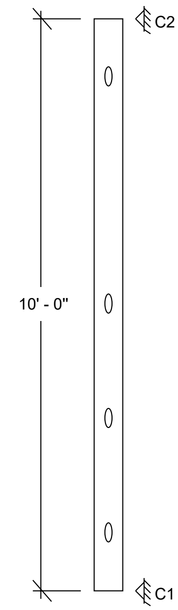
Version 6.0.2.0

ClarkDietrich
ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:02 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-3007.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S200-43 33 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	17244 lb-in	19.90%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	17244 lb-in	19.90%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	15392 lb-in	22.29%	9.66 ft	Custom	Pass
Shear	-81 lbs	1240 lbs	6.56%	10.00 ft	Custom	Pass
V/M Interaction	0.21	1	20.87%	9.66 ft	Custom	Pass
Axial Stability	-3007 lbs	4374 lbs	68.75%	0.00 ft	DL	Pass
P/M Interaction	0.94	1	93.52%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	2.683 in^4	3.45%	7.00 ft	Custom	Pass
Span Deflection	0.017 in	0.5 in	L/6949	7.00 ft	Custom	Pass
Web Crippling	81 lbs	410 lbs	19.83%	C2	Custom	Pass
Web Crippling	19 lbs	410 lbs	4.56%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 21% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 3007 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 5% Capacity

2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

W5 CORRIDOR BEARING WALL, LEVEL 8

9th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 8 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	873	628	260	0	0	0	176
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1146	1255	260	0	0	0	231
TOTAL AXIAL LOAD (lb)	2291	2510	520	0	0	0	462

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

ClarkDietrich ENGINEERING SERVICES

2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

PROJECT NAME:	CFS-NHERI 10 Story Test Portion		
PROJECT NUMBER:	2150200882		
ENGINEER:	L. Padgett	DATE:	10/29/2021
CHECKER:	LAP	DATE:	
SUBJECT:	W5 CORRIDOR BEARING WALL		

W5 CORRIDOR BEARING WALL, LEVEL 8

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	4801	3756	0.782	10.00	50		125	
D + Lr	2811	1071	0.381	10.00	50		125	
D + 0.75L + 0.75Lr	4564	3085	0.676	10.00	50		125	
D + W	2291	1071	0.467	10.00	50		125	
D + 0.7E	2615	1222	0.467	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	4564	3085	0.676	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	4806	3198	0.665	10.00	50		125	
0.6D + W	1375	643	0.467	10.00	50		125	
0.6D - 0.7E	1051	491	0.467	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 288 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

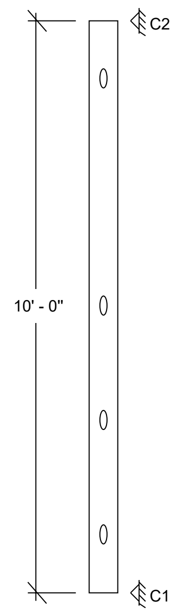
Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:04 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-4806.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in	NA	NA

Specified Member

(1) 600S200-54 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	30397 lb-in	11.29%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	29636 lb-in	11.58%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	27389 lb-in	12.53%	9.66 ft	Custom	Pass
Shear	-81 lbs	1947 lbs	4.18%	10.00 ft	Custom	Pass
V/M Interaction	0.12	1	11.98%	9.66 ft	Custom	Pass
Axial Stability	-4806 lbs	7386 lbs	65.07%	0.00 ft	DL	Pass
P/M Interaction	0.79	1	79.45%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	3.319 in^4	2.79%	7.00 ft	Custom	Pass
Span Deflection	0.014 in	0.5 in	L/8598	7.00 ft	Custom	Pass
Web Crippling	81 lbs	930 lbs	8.74%	C2	Custom	Pass
Web Crippling	19 lbs	930 lbs	2.01%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 21% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 4806 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 5% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 7

8th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 7 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	1261	1255	260	0	0	0	254
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1534	1883	260	0	0	0	309
TOTAL AXIAL LOAD (lb)	3067	3765	520	0	0	0	619

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 7

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	**600**	**S350**	**54 (50)**

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	6832	3756	0.550	10.00	50		125	
D + Lr	3587	1071	0.299	10.00	50		125	
D + 0.75L + 0.75Lr	6281	3085	0.491	10.00	50		125	
D + W	3067	1071	0.349	10.00	50		125	
D + 0.7E	3500	1222	0.349	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	6281	3085	0.491	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	6606	3198	0.484	10.00	50		125	
0.6D + W	1840	643	0.349	10.00	50		125	
0.6D - 0.7E	1407	491	0.349	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 410 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

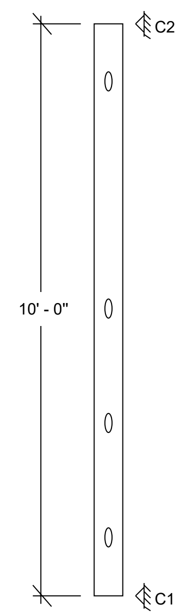
Version 6.0.2.0

ClarkDietrich
ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:05 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-6832.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in	NA	NA

Specified Member

(1) 600S350-54 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	39976 lb-in	8.58%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	39976 lb-in	8.58%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	36566 lb-in	9.38%	9.66 ft	Custom	Pass
Shear	-81 lbs	1947 lbs	4.18%	10.00 ft	Custom	Pass
V/M Interaction	0.09	1	9.47%	9.66 ft	Custom	Pass
Axial Stability	-6832 lbs	10057 lbs	67.94%	0.00 ft	DL	Pass
P/M Interaction	0.79	1	78.61%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	4.722 in^4	1.96%	7.00 ft	Custom	Pass
Span Deflection	0.01 in	0.5 in	L/12230	7.00 ft	Custom	Pass
Web Crippling	81 lbs	930 lbs	8.74%	C2	Custom	Pass
Web Crippling	19 lbs	930 lbs	2.01%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 21% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 6832 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 5% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 6

7th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 6 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	1649	1883	260	0	0	0	333
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1922	2510	260	0	0	0	388
TOTAL AXIAL LOAD (lb)	3843	5020	520	0	0	0	775

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 6

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S250	68 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	8863	3756	0.424	10.00	50		125	
D + Lr	4363	1071	0.245	10.00	50		125	
D + 0.75L + 0.75Lr	7998	3085	0.386	10.00	50		125	
D + W	3843	1071	0.279	10.00	50		125	
D + 0.7E	4386	1222	0.279	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	7998	3085	0.386	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	8405	3198	0.381	10.00	50		125	
0.6D + W	2306	643	0.279	10.00	50		125	
0.6D - 0.7E	1763	491	0.279	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

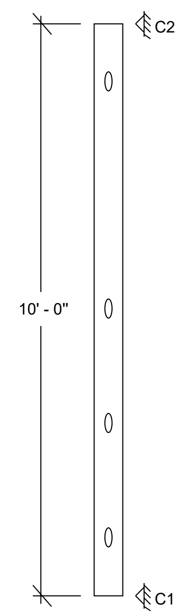
Brace Force (n studs) 6
Prb = 532 lb
Brdg Rows = 2

DesignPro
Wall Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:08 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-8863.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S250-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	41495 lb-in	8.27%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	41495 lb-in	8.27%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	39078 lb-in	8.78%	9.66 ft	Custom	Pass
Shear	-81 lbs	2879 lbs	2.82%	10.00 ft	Custom	Pass
V/M Interaction	0.09	1	8.70%	9.66 ft	Custom	Pass
Axial Stability	-8863 lbs	10865 lbs	81.57%	0.00 ft	DL	Pass
P/M Interaction	0.92	1	92.11%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	4.724 in^4	1.96%	7.00 ft	Custom	Pass
Span Deflection	0.01 in	0.5 in	L/12235	7.00 ft	Custom	Pass
Web Crippling	81 lbs	1389 lbs	5.85%	C2	Custom	Pass
Web Crippling	19 lbs	1389 lbs	1.35%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 12% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 8863 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 3% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 5

6th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 5 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2037	2510	260	0	0	0	411
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	2310	3138	260	0	0	0	466
TOTAL AXIAL LOAD (lb)	4619	6275	520	0	0	0	932

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 5

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	68 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	10894	3756	0.345	10.00	50		125	
D + Lr	5139	1071	0.208	10.00	50		125	
D + 0.75L + 0.75Lr	9715	3085	0.318	10.00	50		125	
D + W	4619	1071	0.232	10.00	50		125	
D + 0.7E	5271	1222	0.232	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	9715	3085	0.318	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	10205	3198	0.313	10.00	50		125	
0.6D + W	2771	643	0.232	10.00	50		125	
0.6D - 0.7E	2119	491	0.232	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 654 lb
Brdg Rows = 2

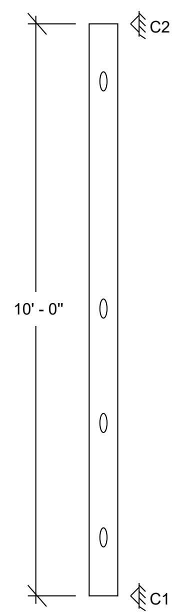
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:09 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-10894.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S350-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	53018 lb-in	6.47%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	53018 lb-in	6.47%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	49703 lb-in	6.90%	9.66 ft	Custom	Pass
Shear	-81 lbs	2879 lbs	2.82%	10.00 ft	Custom	Pass
V/M Interaction	0.07	1	7.01%	9.66 ft	Custom	Pass
Axial Stability	-10894 lbs	14473 lbs	75.27%	0.00 ft	DL	Pass
P/M Interaction	0.83	1	83.44%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	6.167 in^4	1.50%	7.00 ft	Custom	Pass
Span Deflection	0.008 in	0.5 in	L/15974	7.00 ft	Custom	Pass
Web Crippling	81 lbs	1389 lbs	5.85%	C2	Custom	Pass
Web Crippling	19 lbs	1389 lbs	1.35%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 10894 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 4

5th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 4 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2425	3138	260	0	0	0	489
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	2698	3765	260	0	0	0	544
TOTAL AXIAL LOAD (lb)	5395	7530	520	0	0	0	1088

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 4

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	68 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	12925	3756	0.291	10.00	50		125	
D + Lr	5915	1071	0.181	10.00	50		125	
D + 0.75L + 0.75Lr	11433	3085	0.270	10.00	50		125	
D + W	5395	1071	0.199	10.00	50		125	
D + 0.7E	6157	1222	0.199	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	11433	3085	0.270	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	12004	3198	0.266	10.00	50		125	
0.6D + W	3237	643	0.199	10.00	50		125	
0.6D - 0.7E	2475	491	0.199	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 776 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

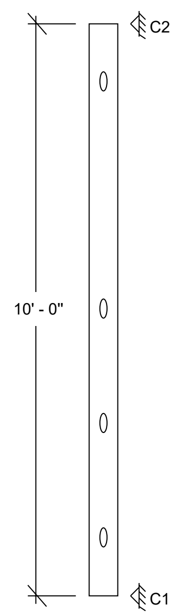
Version 6.0.2.0

ClarkDietrich
ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:11 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-12925.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S350-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	53018 lb-in	6.47%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	53018 lb-in	6.47%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	49703 lb-in	6.90%	9.66 ft	Custom	Pass
Shear	-81 lbs	2879 lbs	2.82%	10.00 ft	Custom	Pass
V/M Interaction	0.07	1	7.01%	9.66 ft	Custom	Pass
Axial Stability	-12925 lbs	14473 lbs	89.30%	0.00 ft	DL	Pass
P/M Interaction	0.98	1	97.77%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	6.167 in^4	1.50%	7.00 ft	Custom	Pass
Span Deflection	0.008 in	0.5 in	L/15974	7.00 ft	Custom	Pass
Web Crippling	81 lbs	1389 lbs	5.85%	C2	Custom	Pass
Web Crippling	19 lbs	1389 lbs	1.35%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 12925 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 3

4th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 3 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2813	3765	260	0	0	0	567
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3086	4393	260	0	0	0	623
TOTAL AXIAL LOAD (lb)	6171	8785	520	0	0	0	1245

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 3

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	**600**	**S250**	**97 (50)**

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	14956	3756	0.251	10.00	50		125	
D + Lr	6691	1071	0.160	10.00	50		125	
D + 0.75L + 0.75Lr	13150	3085	0.235	10.00	50		125	
D + W	6171	1071	0.174	10.00	50		125	
D + 0.7E	7043	1222	0.174	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	13150	3085	0.235	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	13803	3198	0.232	10.00	50		125	
0.6D + W	3703	643	0.174	10.00	50		125	
0.6D - 0.7E	2831	491	0.174	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 897 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

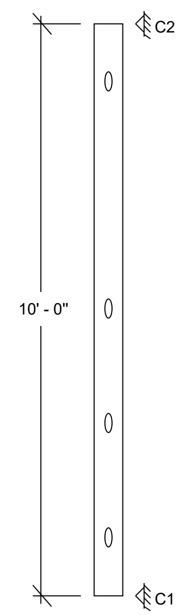
Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:13 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-14956.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S250-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	69935 lb-in	4.91%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	62257 lb-in	5.51%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	61581 lb-in	5.57%	9.66 ft	Custom	Pass
Shear	-81 lbs	3805 lbs	2.14%	10.00 ft	Custom	Pass
V/M Interaction	0.05	1	5.32%	9.66 ft	Custom	Pass
Axial Stability	-14956 lbs	17754 lbs	84.24%	0.00 ft	DL	Pass
P/M Interaction	0.91	1	91.25%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	6.497 in^4	1.43%	7.00 ft	Custom	Pass
Span Deflection	0.007 in	0.5 in	L/16828	7.00 ft	Custom	Pass
Web Crippling	81 lbs	2572 lbs	3.16%	C2	Custom	Pass
Web Crippling	19 lbs	2572 lbs	0.73%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 14956 lbs

600T125-97 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 2

3rd FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 2 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	3201	4393	260	0	0	0	646
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3474	5020	260	0	0	0	701
TOTAL AXIAL LOAD (lb)	6947	10040	520	0	0	0	1402

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 2

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	16987	3756	0.221	10.00	50		125	
D + Lr	7467	1071	0.143	10.00	50		125	
D + 0.75L + 0.75Lr	14867	3085	0.207	10.00	50		125	
D + W	6947	1071	0.154	10.00	50		125	
D + 0.7E	7928	1222	0.154	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	14867	3085	0.207	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	15603	3198	0.205	10.00	50		125	
0.6D + W	4168	643	0.154	10.00	50		125	
0.6D - 0.7E	3187	491	0.154	10.00	50		125	

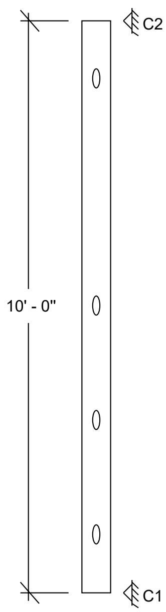
SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 1019 lb
Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:13 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-16987.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S300-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	67292 lb-in	5.10%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	67292 lb-in	5.10%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	64684 lb-in	5.30%	9.66 ft	Custom	Pass
Shear	-81 lbs	3805 lbs	2.14%	10.00 ft	Custom	Pass
V/M Interaction	0.05	1	5.49%	9.66 ft	Custom	Pass
Axial Stability	-16987 lbs	18943 lbs	89.68%	0.00 ft	DL	Pass
P/M Interaction	0.96	1	96.35%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	7.281 in^4	1.27%	7.00 ft	Custom	Pass
Span Deflection	0.006 in	0.5 in	L/18859	7.00 ft	Custom	Pass
Web Crippling	81 lbs	2572 lbs	3.16%	C2	Custom	Pass
Web Crippling	19 lbs	2572 lbs	0.73%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 16987 lbs

600T125-97 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

W5 CORRIDOR BEARING WALL, LEVEL 1

2nd FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 1 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	24 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.000
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	3589	5020	260	0	0	0	724
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3862	5648	260	0	0	0	779
TOTAL AXIAL LOAD (lb)	7723	11295	520	0	0	0	1558

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

W5 CORRIDOR BEARING WALL, LEVEL 1

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	19018	3756	0.197	10.00	50		125	
D + Lr	8243	1071	0.130	10.00	50		125	
D + 0.75L + 0.75Lr	16584	3085	0.186	10.00	50		125	
D + W	7723	1071	0.139	10.00	50		125	
D + 0.7E	8814	1222	0.139	10.00	50		125	
D + 0.75L + 0.75W + .75Lr	16584	3085	0.186	10.00	50		125	
D + 0.75L + 0.525E + .75Lr	17402	3198	0.184	10.00	50		125	
0.6D + W	4634	643	0.139	10.00	50		125	
0.6D - 0.7E	3543	491	0.139	10.00	50		125	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	10.00	50	125			

Brace Force (n studs) 6
Prb = 1141 lb
Brdg Rows = 2

DesignPro
Wall Designer Output

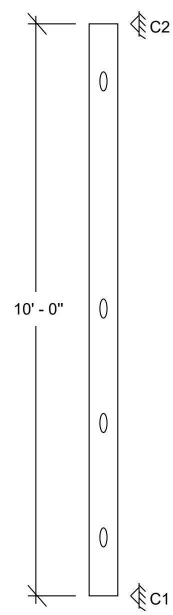
Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	W5: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 5:14 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB68-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-19018.00 lbs	NA	NA
Moment	Pressure	Global Mz	9.66 ft	-3756 lb-in ↻	NA	NA

Specified Member

(1) 600S350-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	-3431 lb-in	77650 lb-in	4.42%	9.66 ft	Custom	Pass
Moment: Stability	-3431 lb-in	77650 lb-in	4.42%	9.66 ft	Custom	Pass
Moment: Dist. Buckling	-3431 lb-in	78371 lb-in	4.38%	9.66 ft	Custom	Pass
Shear	-81 lbs	3805 lbs	2.14%	10.00 ft	Custom	Pass
V/M Interaction	0.05	1	4.87%	9.66 ft	Custom	Pass
Axial Stability	-19018 lbs	23364 lbs	81.40%	0.00 ft	DL	Pass
P/M Interaction	0.87	1	86.90%	9.66 ft	Custom	Pass
Moment of Inertia	0.093 in^4	8.632 in^4	1.07%	7.00 ft	Custom	Pass
Span Deflection	0.005 in	0.5 in	L/22359	7.00 ft	Custom	Pass
Web Crippling	81 lbs	2572 lbs	3.16%	C2	Custom	Pass
Web Crippling	19 lbs	2572 lbs	0.73%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 81.3 lbs			Ry = 0 lbs

600T125-68 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 10% Capacity

C1:	Wind:	Rx = 18.7 lbs			Ry = 19018 lbs

600T125-97 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 2% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL

DESIGNED PER THE REQUIREMENTS OF AISI: 2016 NAS - US (ASD)

WALL NOTES

3x7 doors at Corridor/Unit Walls

DEFAULT FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in
FLOOR FRAMING TYPE LEDGER FRAMED

DEFAULT WALL DETAILS

WALL TYPE	INTERIOR WALL	FLANGE BRACING	NONE
STUD DEPTH	6.000 in	BRACING Ly =	4.00 ft
STUD OC SPACING	32 in	BRACING Lt =	4.00 ft

FOUNDATION LINE LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
SERVICE LEVEL LOADS	3862	5648	260	0	0	0	779

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 10

ROOF DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	ROOF	RIGHT LOADING TYPE	ROOF
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 10 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	54	0	45	0	0	0	11
CENTERLINE OF WALL (plf)	58	0	0	0	0	0	12
RIGHT SIDE OF WALL (plf)	258	0	215	0	0	0	52
TOTAL LINE LOAD (plf)	370	0	260	0	0	0	75
TOTAL AXIAL LOAD (lb)	985	0	693	0	0	0	199

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 10

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S162	43 (33)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity	Mx,max ft-lb	Unity
D + L	985	1632	1.656	13.33	67		167	
D + Lr	1679	2992	1.782	13.33	67		167	
D + 0.75L + 0.75Lr	1505	2652	1.762	13.33	67		167	
D + W	985	1632	1.656	13.33	67		167	
D + 0.7E	1124	1862	1.656	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	1505	2652	1.762	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	1610	2825	1.755	13.33	67		167	
0.6D + W	591	979	1.656	13.33	67		167	
0.6D - 0.7E	452	749	1.656	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	13.33	67	167			

Brace Force (n studs) 17
Prb = 285 lb
Brdg Rows = 2

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ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:10 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

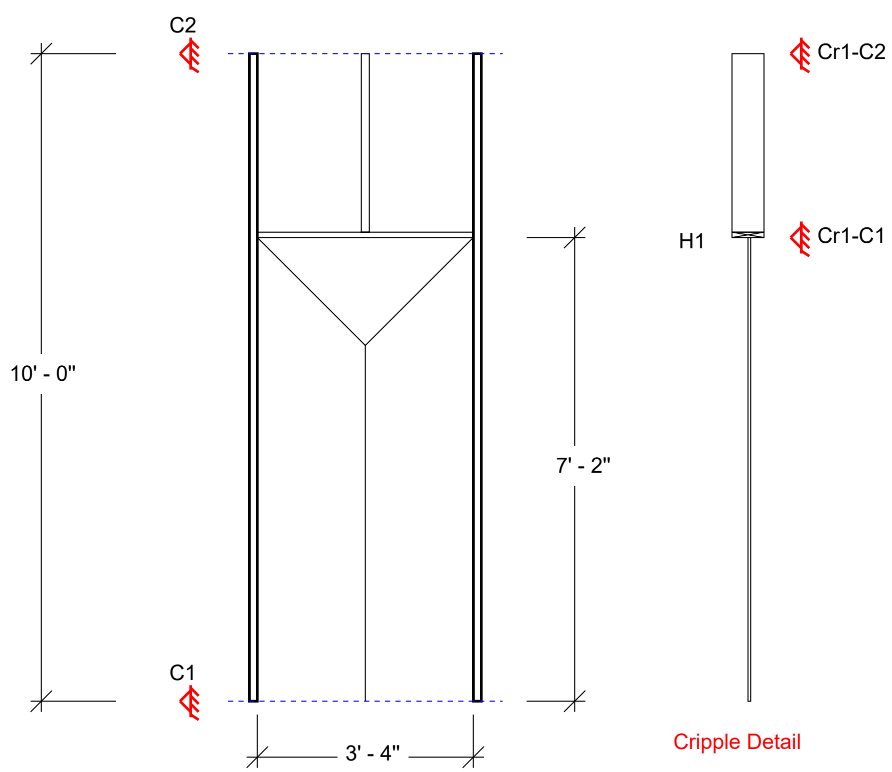
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-1679.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-2992 lb-in	Yes	No	No

Design



DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name: CFS-NHERI 10 Story Archetype
Project Number: 2150200882-0
Opening: H1: Level 10 - Test
Date/Time: 10/29/2021 / 9:10 AM

Company: ClarkDietrich Engineering Services LLC
Contact Name: Lynn Padgett, P.E.
Phone Number: 678.304.5525

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.

Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:10 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	410	3.46%	C2	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 24" O.C. - 5% Capacity

C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs

[ICC] Cripple Connection to Head Track @ 3% Capacity

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Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:10 AM		

Jamb Results

Punched Stud Member: (1) 600S162-43 33
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-2992 lb-in	16781 lb-in	17.83%	10.00 ft	Custom	PASS
M_stb	-2992 lb-in	14623 lb-in	20.46%	10.00 ft	Custom	PASS
M_dist	-2992 lb-in	13562 lb-in	22.06%	10.00 ft	Custom	PASS
V	-80 lbs	1240 lbs	6.46%	10.00 ft	Custom	PASS
V/M	0.19	1	18.97%	10.00 ft	Custom	PASS
P	1797 lbs	3522 lbs	51.01%	0.00 ft	DL	PASS
P/M	0.71	1	71.25%	10.00 ft	Custom	PASS
I_req	0.03 in4	2.316 in4	1.31%	3.00 ft	Custom	PASS
Span Δ	0.007 in	0.5 in	L/18370	3.00 ft	Custom	PASS
Web Crippling	80	410	19.55%	C2	Custom	PASS
Web Crippling	41	205	20.15%	C1	Custom	PASS

C2:	Wind:	Rx = 80 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 30% Capacity

C1:	Wind:	Rx = 41 lbs			Ry = 1797 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 16% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 9

10th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 9 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	485	0	260	0	0	0	98
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	758	628	260	0	0	0	153
TOTAL AXIAL LOAD (lb)	2020	1673	693	0	0	0	408

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 9

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	S162	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	3693	5008	1.356	13.33	67		167	
D + Lr	2713	1428	0.526	13.33	67		167	
D + 0.75L + 0.75Lr	3795	4113	1.084	13.33	67		167	
D + W	2020	1428	0.707	13.33	67		167	
D + 0.7E	2305	1630	0.707	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	3795	4113	1.084	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	4009	4264	1.064	13.33	67		167	
0.6D + W	1212	857	0.707	13.33	67		167	
0.6D - 0.7E	927	655	0.707	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 241 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:12 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

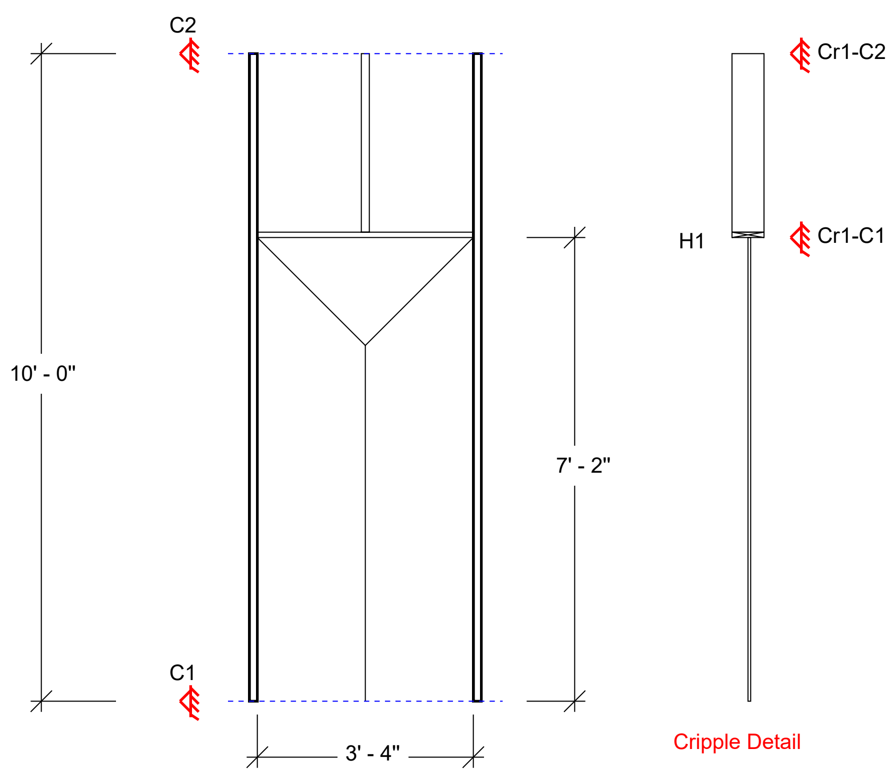
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-4009.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

Design



DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:12 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.

Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs

(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:12 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:12 AM		

Jamb Results

Punched Stud Member: (1) 600S162-54 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	30714 lb-in	16.31%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	24925 lb-in	20.09%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	24235 lb-in	20.66%	10.00 ft	Custom	PASS
V	-97 lbs	1947 lbs	4.98%	10.00 ft	Custom	PASS
V/M	0.17	1	17.05%	10.00 ft	Custom	PASS
P	4127 lbs	5728 lbs	72.05%	0.00 ft	DL	PASS
P/M	0.94	1	93.60%	10.00 ft	Custom	PASS
I_req	0.128 in4	2.86 in4	4.49%	7.00 ft	Custom	PASS
Span Δ	0.022 in	0.5 in	L/5343	7.00 ft	Custom	PASS
Web Crippling	97	930	10.42%	C2	Custom	PASS
Web Crippling	25	465	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 4127 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 8

9th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 8 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	873	628	260	0	0	0	176
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1146	1255	260	0	0	0	231
TOTAL AXIAL LOAD (lb)	3055	3347	693	0	0	0	616

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 8

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	54 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	6401	5008	0.782	13.33	67		167	
D + Lr	3748	1428	0.381	13.33	67		167	
D + 0.75L + 0.75Lr	6085	4113	0.676	13.33	67		167	
D + W	3055	1428	0.467	13.33	67		167	
D + 0.7E	3486	1630	0.467	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	6085	4113	0.676	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	6408	4264	0.665	13.33	67		167	
0.6D + W	1833	857	0.467	13.33	67		167	
0.6D - 0.7E	1401	655	0.467	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 384 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:14 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

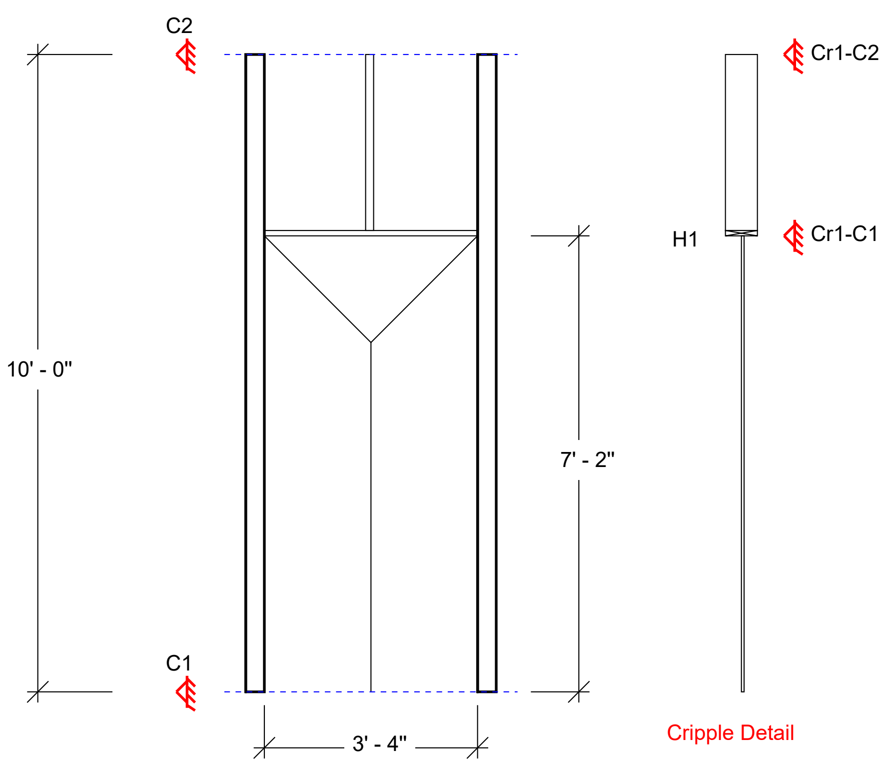
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-6408.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

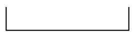
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:14 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:14 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

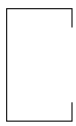
C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:14 AM		

Jamb Results



Punched Stud Member: (1) 600S350-54 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	39976 lb-in	12.53%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	39976 lb-in	12.53%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	36566 lb-in	13.70%	10.00 ft	Custom	PASS
V	-97 lbs	1947 lbs	4.98%	10.00 ft	Custom	PASS
V/M	0.13	1	13.48%	10.00 ft	Custom	PASS
P	6526 lbs	10057 lbs	64.89%	0.00 ft	DL	PASS
P/M	0.79	1	79.17%	10.00 ft	Custom	PASS
I_req	0.128 in4	4.722 in4	2.72%	7.00 ft	Custom	PASS
Span Δ	0.014 in	0.5 in	L/8819	7.00 ft	Custom	PASS
Web Crippling	97	930	10.42%	C2	Custom	PASS
Web Crippling	25	465	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 6526 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 7

8th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 7 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	1261	1255	260	0	0	0	254
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1534	1883	260	0	0	0	309
TOTAL AXIAL LOAD (lb)	4089	5020	693	0	0	0	825

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

ClarkDietrich
ENGINEERING SERVICES
2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 7

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	68 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	9109	5008	0.550	13.33	67		167	
D + Lr	4783	1428	0.299	13.33	67		167	
D + 0.75L + 0.75Lr	8374	4113	0.491	13.33	67		167	
D + W	4089	1428	0.349	13.33	67		167	
D + 0.7E	4667	1630	0.349	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	8374	4113	0.491	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	8807	4264	0.484	13.33	67		167	
0.6D + W	2454	857	0.349	13.33	67		167	
0.6D - 0.7E	1876	655	0.349	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 547 lb
Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:16 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

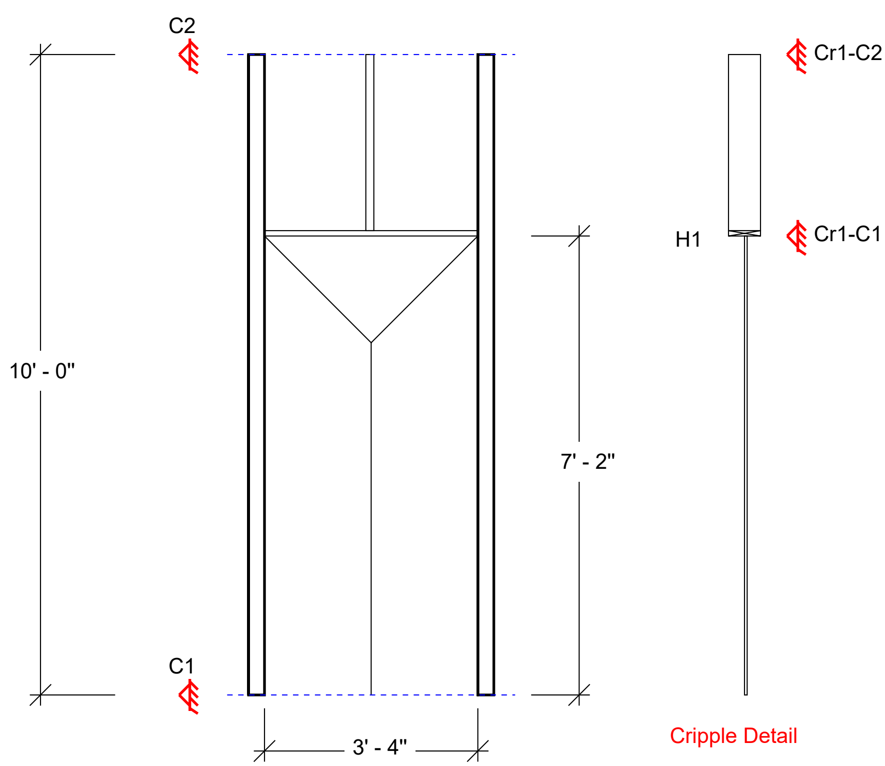
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-9109.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:16 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.

Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:16 AM		

Uniform Cripple Results

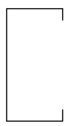
Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:16 AM		

Jamb Results



Punched Stud Member: (1) 600S300-68 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	43300 lb-in	11.57%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	43300 lb-in	11.57%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	40535 lb-in	12.35%	10.00 ft	Custom	PASS
V	-97 lbs	2879 lbs	3.37%	10.00 ft	Custom	PASS
V/M	0.12	1	12.05%	10.00 ft	Custom	PASS
P	9227 lbs	11017 lbs	83.75%	0.00 ft	DL	PASS
P/M	0.97	1	97.24%	10.00 ft	Custom	PASS
I_req	0.128 in4	5.222 in4	2.46%	7.00 ft	Custom	PASS
Span Δ	0.012 in	0.5 in	L/9754	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 9227 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 6

7th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 6 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	1649	1883	260	0	0	0	333
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	1922	2510	260	0	0	0	388
TOTAL AXIAL LOAD (lb)	5124	6693	693	0	0	0	1034

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 6

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	68 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	11817	5008	0.424	13.33	67		167	
D + Lr	5817	1428	0.245	13.33	67		167	
D + 0.75L + 0.75Lr	10664	4113	0.386	13.33	67		167	
D + W	5124	1428	0.279	13.33	67		167	
D + 0.7E	5848	1630	0.279	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	10664	4113	0.386	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	11207	4264	0.381	13.33	67		167	
0.6D + W	3074	857	0.279	13.33	67		167	
0.6D - 0.7E	2351	655	0.279	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 709 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:17 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

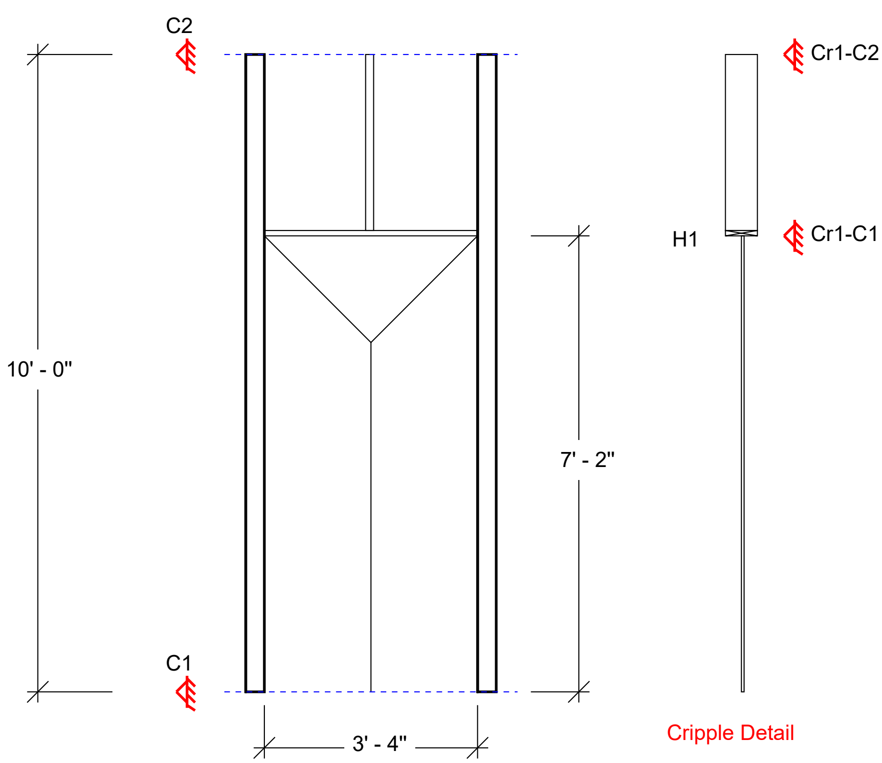
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-11817.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

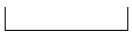
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:17 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:17 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

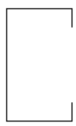
C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:17 AM		

Jamb Results



Punched Stud Member: (1) 600S350-68 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	53018 lb-in	9.45%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	53018 lb-in	9.45%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	49703 lb-in	10.08%	10.00 ft	Custom	PASS
V	-97 lbs	2879 lbs	3.37%	10.00 ft	Custom	PASS
V/M	0.10	1	10.03%	10.00 ft	Custom	PASS
P	11935 lbs	14473 lbs	82.46%	0.00 ft	DL	PASS
P/M	0.94	1	93.77%	10.00 ft	Custom	PASS
I_req	0.128 in4	6.167 in4	2.08%	7.00 ft	Custom	PASS
Span Δ	0.01 in	0.5 in	L/11519	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 11935 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 5

6th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 5 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2037	2510	260	0	0	0	411
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	2310	3138	260	0	0	0	466
TOTAL AXIAL LOAD (lb)	6159	8367	693	0	0	0	1243

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 5

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S250	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	14525	5008	0.345	13.33	67		167	
D + Lr	6852	1428	0.208	13.33	67		167	
D + 0.75L + 0.75Lr	12954	4113	0.318	13.33	67		167	
D + W	6159	1428	0.232	13.33	67		167	
D + 0.7E	7028	1630	0.232	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	12954	4113	0.318	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	13606	4264	0.313	13.33	67		167	
0.6D + W	3695	857	0.232	13.33	67		167	
0.6D - 0.7E	2825	655	0.232	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 872 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:22 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

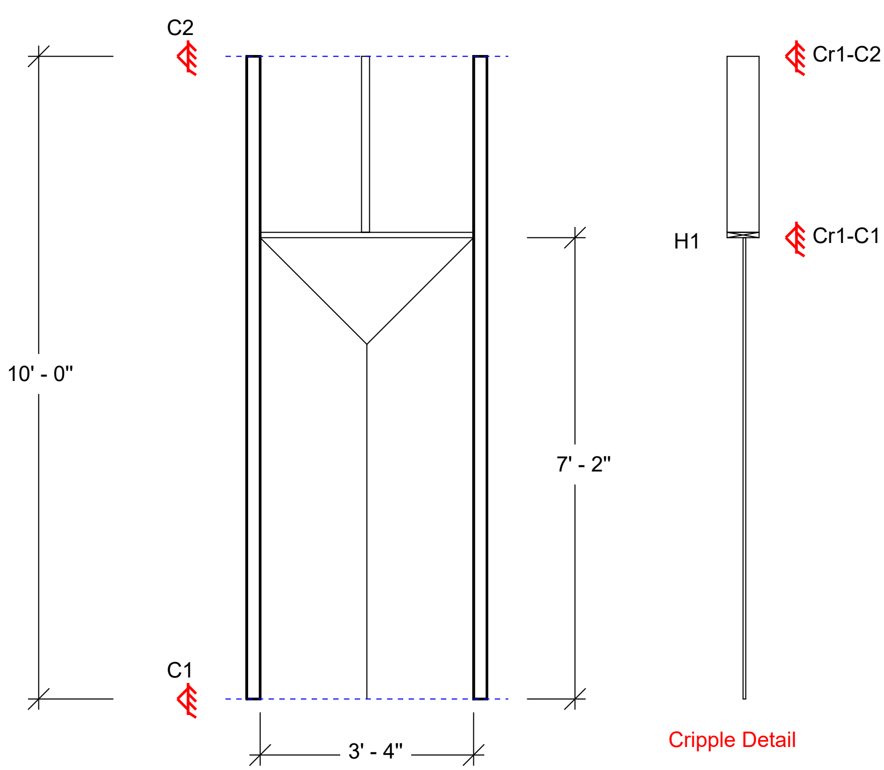
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-14525.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

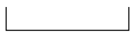
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:22 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:22 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:22 AM		

Jamb Results

Punched Stud Member: (1) 600S250-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	69935 lb-in	7.16%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	62257 lb-in	8.04%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	61581 lb-in	8.13%	10.00 ft	Custom	PASS
V	-97 lbs	3805 lbs	2.55%	10.00 ft	Custom	PASS
V/M	0.08	1	7.60%	10.00 ft	Custom	PASS
P	14643 lbs	17754 lbs	82.48%	0.00 ft	DL	PASS
P/M	0.92	1	91.97%	10.00 ft	Custom	PASS
I_req	0.128 in4	6.497 in4	1.98%	7.00 ft	Custom	PASS
Span Δ	0.01 in	0.5 in	L/12135	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 14643 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 4

5th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 4 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2425	3138	260	0	0	0	489
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	2698	3765	260	0	0	0	544
TOTAL AXIAL LOAD (lb)	7193	10040	693	0	0	0	1451

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 4

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	17233	5008	0.291	13.33	67		167	
D + Lr	7887	1428	0.181	13.33	67		167	
D + 0.75L + 0.75Lr	15243	4113	0.270	13.33	67		167	
D + W	7193	1428	0.199	13.33	67		167	
D + 0.7E	8209	1630	0.199	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	15243	4113	0.270	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	16005	4264	0.266	13.33	67		167	
0.6D + W	4316	857	0.199	13.33	67		167	
0.6D - 0.7E	3300	655	0.199	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 1034 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:23 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

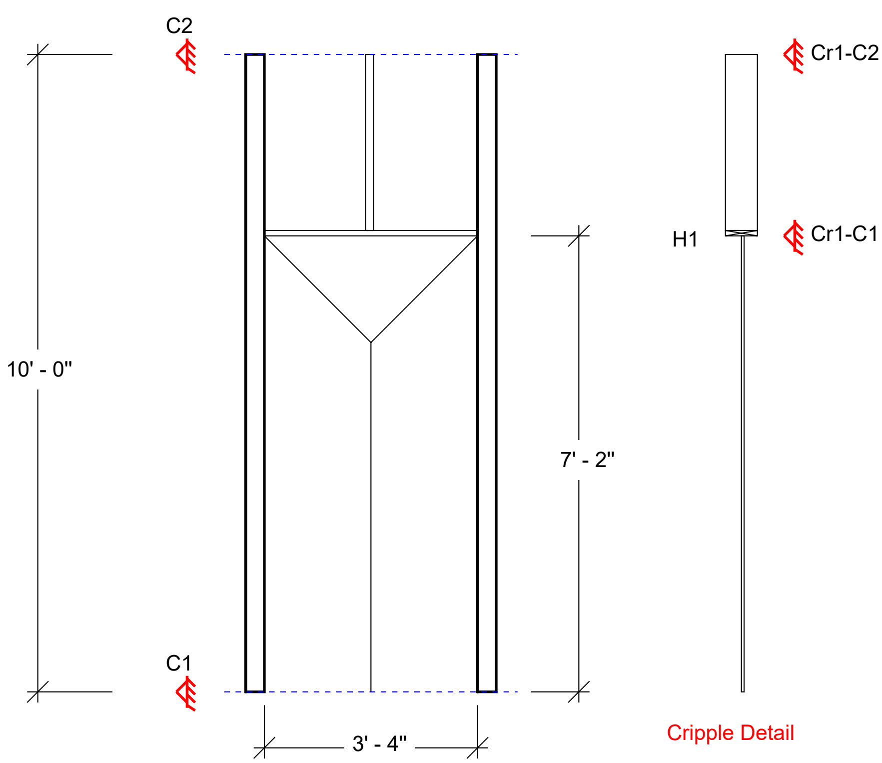
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-17233.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:23 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.

Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:23 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				

C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:23 AM		

Jamb Results

Punched Stud Member: (1) 600S350-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	77650 lb-in	6.45%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	77650 lb-in	6.45%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	78371 lb-in	6.39%	10.00 ft	Custom	PASS
V	-97 lbs	3805 lbs	2.55%	10.00 ft	Custom	PASS
V/M	0.07	1	6.93%	10.00 ft	Custom	PASS
P	17351 lbs	23364 lbs	74.26%	0.00 ft	DL	PASS
P/M	0.82	1	81.60%	10.00 ft	Custom	PASS
I_req	0.128 in4	8.632 in4	1.49%	7.00 ft	Custom	PASS
Span Δ	0.007 in	0.5 in	L/16123	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 17351 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 3

4th FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 3 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D plf	L plf	Lr plf	S plf	W (plf)		E plf
					DOWN (+)	UPLIFT (-)	
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	2813	3765	260	0	0	0	567
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3086	4393	260	0	0	0	623
TOTAL AXIAL LOAD (lb)	8228	11713	693	0	0	0	1660

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 3

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	19941	5008	0.251	13.33	67		167	
D + Lr	8921	1428	0.160	13.33	67		167	
D + 0.75L + 0.75Lr	17533	4113	0.235	13.33	67		167	
D + W	8228	1428	0.174	13.33	67		167	
D + 0.7E	9390	1630	0.174	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	17533	4113	0.235	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	18405	4264	0.232	13.33	67		167	
0.6D + W	4937	857	0.174	13.33	67		167	
0.6D - 0.7E	3775	655	0.174	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 1196 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:25 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

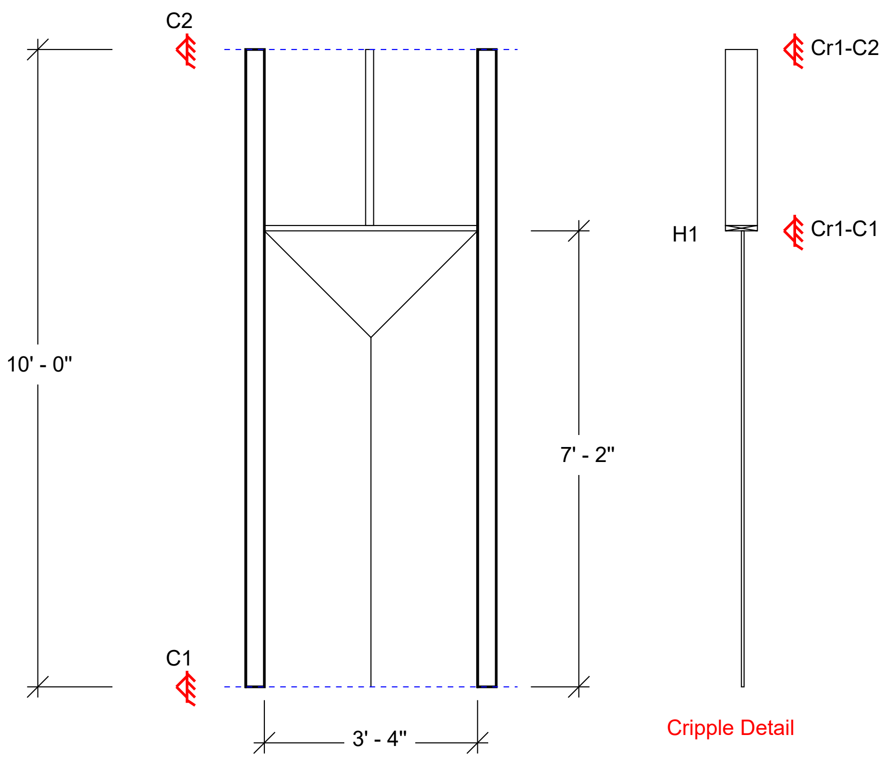
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-19941.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

Design

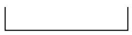


DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:25 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:25 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	**Actual**	**Allowable**	**Capacity**	**Location**	**Controlled By**	**Pass/FAIL**
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:25 AM		

Jamb Results

Punched Stud Member: (1) 600S350-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	77650 lb-in	6.45%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	77650 lb-in	6.45%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	78371 lb-in	6.39%	10.00 ft	Custom	PASS
V	-97 lbs	3805 lbs	2.55%	10.00 ft	Custom	PASS
V/M	0.07	1	6.93%	10.00 ft	Custom	PASS
P	20059 lbs	23364 lbs	85.85%	0.00 ft	DL	PASS
P/M	0.93	1	93.47%	10.00 ft	Custom	PASS
I_req	0.128 in4	8.632 in4	1.49%	7.00 ft	Custom	PASS
Span Δ	0.007 in	0.5 in	L/16123	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 20059 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 2

3rd FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 2 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	3201	4393	260	0	0	0	646
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3474	5020	260	0	0	0	701
TOTAL AXIAL LOAD (lb)	9263	13387	693	0	0	0	1869

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 2

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1		600	HDS300	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	22649	5008	0.221	13.33	67		167	
D + Lr	9956	1428	0.143	13.33	67		167	
D + 0.75L + 0.75Lr	19823	4113	0.207	13.33	67		167	
D + W	9263	1428	0.154	13.33	67		167	
D + 0.7E	10571	1630	0.154	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	19823	4113	0.207	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	20804	4264	0.205	13.33	67		167	
0.6D + W	5558	857	0.154	13.33	67		167	
0.6D - 0.7E	4249	655	0.154	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 1359 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:27 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

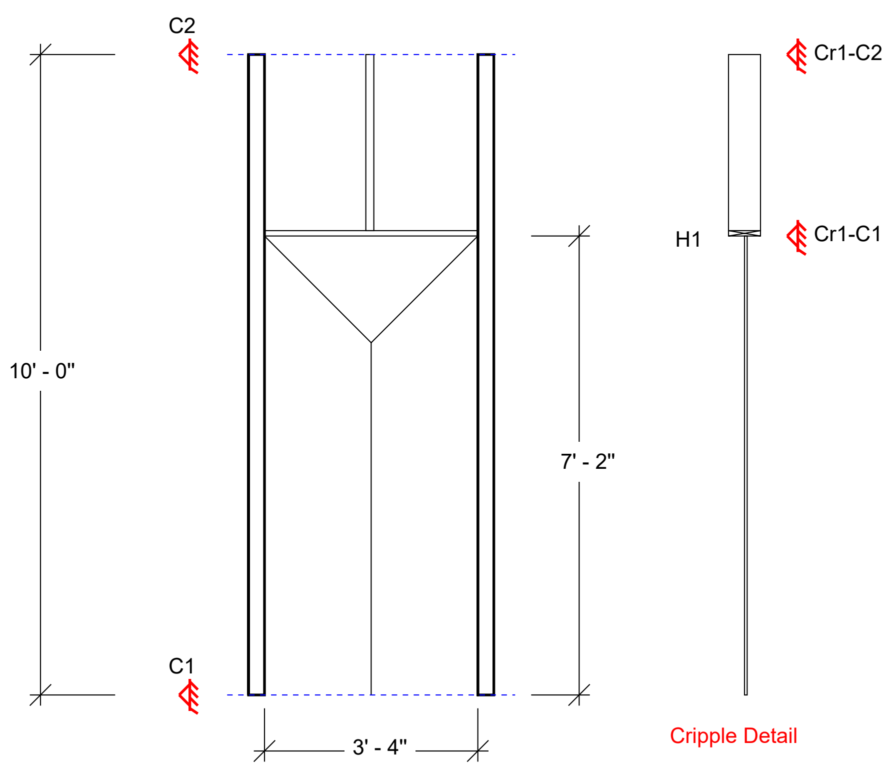
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-22649.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:27 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.

Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:27 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

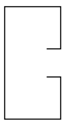
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:27 AM		

Jamb Results



Unpunched HDS Member: (1) 600HDS300-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	91817 lb-in	5.45%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	83195 lb-in	6.02%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	75993 lb-in	6.59%	10.00 ft	Custom	PASS
V	-97 lbs	10471 lbs	0.93%	10.00 ft	Custom	PASS
V/M	0.06	1	5.53%	10.00 ft	Custom	PASS
P	22767 lbs	33236 lbs	68.50%	0.00 ft	DL	PASS
P/M	0.77	1	76.84%	10.00 ft	Custom	PASS
I_req	0.128 in4	8.336 in4	1.54%	7.00 ft	Custom	PASS
Span Δ	0.008 in	0.5 in	L/15570	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 22767 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 9% Capacity

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 1

2nd FLOOR DETAILS

LEFT SPAN LENGTH	4.50 ft	RIGHT SPAN	21.50 ft
LEFT LOADING TYPE	CORRIDOR	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 1 WALL DETAILS

WALL TYPE	INTERIOR WALL	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	32 in
WALL DL	115.0 plf	OC LOAD FACTOR	2.667
DEFLECTION LIMIT	L / 240		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	47	90	0	0	0	0	10
CENTERLINE OF WALL (plf)	3589	5020	260	0	0	0	724
RIGHT SIDE OF WALL (plf)	226	538	0	0	0	0	46
TOTAL LINE LOAD (plf)	3862	5648	260	0	0	0	779
TOTAL AXIAL LOAD (lb)	10297	15060	693	0	0	0	2078

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

H1: 3'-4" OPENING JOIST BEARING WALL, LEVEL 1

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	HDS300	97 (50)

ASD LOAD COMBINATION	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	25357	5008	0.197	13.33	67		167	
D + Lr	10991	1428	0.130	13.33	67		167	
D + 0.75L + 0.75Lr	22112	4113	0.186	13.33	67		167	
D + W	10297	1428	0.139	13.33	67		167	
D + 0.7E	11752	1630	0.139	13.33	67		167	
D + 0.75L + 0.75W + .75Lr	22112	4113	0.186	13.33	67		167	
D + 0.75L + 0.525E + .75Lr	23203	4264	0.184	13.33	67		167	
0.6D + W	6178	857	0.139	13.33	67		167	
0.6D - 0.7E	4724	655	0.139	13.33	67		167	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	13.33	67	167			

Brace Force (n studs) 6
Prb = 1521 lb
Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:28 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/240
Wind Zone:	Custom	0.7 Wind Load Deflection Used:	No
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/240
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	-8 psf

Wind Pressures

Span(1) Pressure: 5.00 psf
Opening(1) Pressure: 5.00 psf

Opening Dead Load

Opening(1): -8 psf

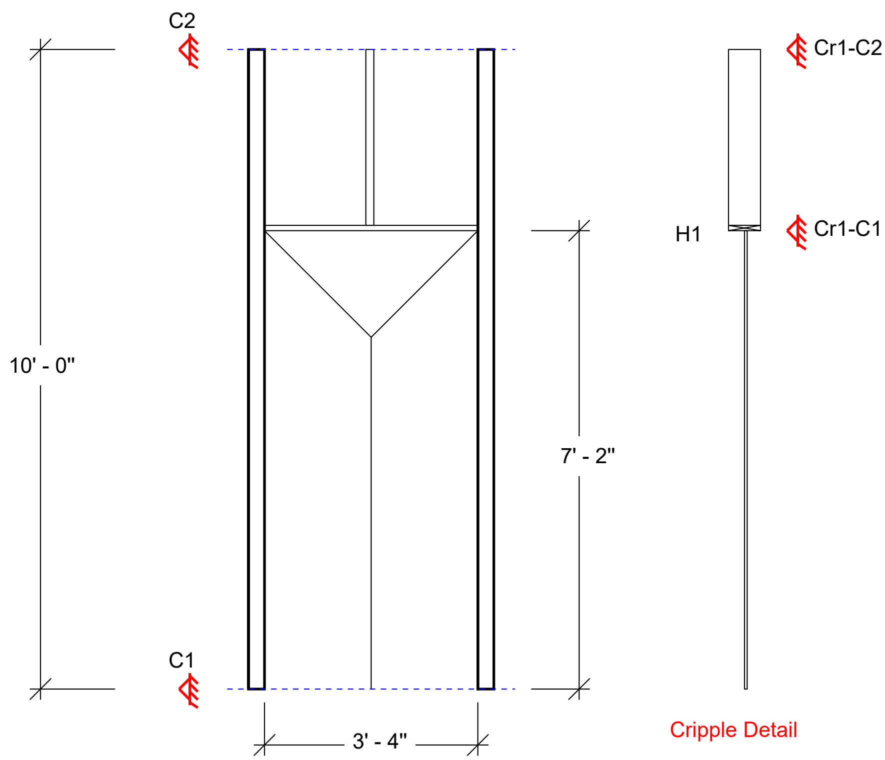
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Pressure	Global FY	NA	10.00 ft	-25357.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-5008 lb-in	Yes	No	No

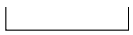
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:28 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	210 lb-in	9114 lb-in	2.31%	1.67 ft	Custom	PASS
Vx	19 lbs	1377 lbs	1.36%	0.00 ft	Custom	PASS
VMx	0.02	1	2.31%	1.59 ft	Custom	PASS
Ix	0.007 in4	1.768 in4	0.40%	1.67 ft	Custom	PASS
Δx	0.001 in	0.167 in	L/60689	1.67 ft	Custom	PASS
My	377 lb-in	487 lb-in	77.49%	1.67 ft	DL	PASS
Vy	38 lbs	1265 lbs	2.98%	0.00 ft	DL	PASS
VMy	0.77	1	77.49%	1.59 ft	DL	PASS
Iy	0.013 in4	0.044 in4	29.31%	1.67 ft	DL	PASS
Δy	0.049 in	0.167 in	L/819	1.67 ft	DL	PASS
Mx+My	0.80	1	79.79%	1.67 ft	Custom	PASS
Vx+Vy	0.00	1	0.11%	0.00 ft	Custom	PASS
Mx+My+Vx+Vy	0.64	1	63.78%	---	---	PASS

Head Connection to Jamb: Rx = 19 lbs, Ry = 38 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:28 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	120 lb-in	16781 lb-in	0.72%	1.42 ft	Custom	PASS
M_stb	120 lb-in	15254 lb-in	0.79%	1.42 ft	Custom	PASS
M_dist	120 lb-in	13562 lb-in	0.89%	1.42 ft	Custom	PASS
V	14 lbs	1240 lbs	1.14%	0.00 ft	Custom	PASS
V/M	0.01	1	1.14%	0.00 ft	Custom	PASS
P	45 lbs	4062 lbs	1.12%	0.00 ft	DL	PASS
P/M	0.02	1	1.53%	0.99 ft	Custom	PASS
I_req	0.003 in4	2.316 in4	0.15%	1.42 ft	Custom	PASS
Span Δ	0 in	0.142 in	L/160077	1.42 ft	Custom	PASS
Web Crippling	14	269	5.27%	C2	Custom	PASS
Web Crippling	14	269	5.27%	C1	Custom	PASS

C2:	Wind:	Rx = 14 lbs			Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = 14 lbs			Ry = 45 lbs
	Connection:				

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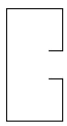
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H1: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:28 AM		

Jamb Results



Unpunched HDS Member: (1) 600HDS300-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-5008 lb-in	91817 lb-in	5.45%	10.00 ft	Custom	PASS
M_stb	-5008 lb-in	83195 lb-in	6.02%	10.00 ft	Custom	PASS
M_dist	-5008 lb-in	75993 lb-in	6.59%	10.00 ft	Custom	PASS
V	-97 lbs	10471 lbs	0.93%	10.00 ft	Custom	PASS
V/M	0.06	1	5.53%	10.00 ft	Custom	PASS
P	25475 lbs	33236 lbs	76.65%	0.00 ft	DL	PASS
P/M	0.85	1	85.33%	10.00 ft	Custom	PASS
I_req	0.128 in4	8.336 in4	1.54%	7.00 ft	Custom	PASS
Span Δ	0.008 in	0.5 in	L/15570	7.00 ft	Custom	PASS
Web Crippling	97	1047	9.26%	C2	Custom	PASS
Web Crippling	25	524	4.68%	C1	Custom	PASS

C2:	Wind:	Rx = 97 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = 25 lbs			Ry = 25475 lbs

[ICC] 600T125-43 33 ksi Track w/ (1) 0.157" x 1" Hilti X-U to 3000 psi Concrete at each Jamb - 12% Capacity

4'-8" EXT OPENING JOIST BEARING WALL

DESIGNED PER THE REQUIREMENTS OF AISI: 2016 NAS - US (ASD)

WALL NOTES

4'-8" W x 4'-0" H Window w/ 2'-8" Sill (At Units)

DEFAULT FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH	12 in
FLOOR FRAMING TYPE	LEDGER FRAMED

DEFAULT WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	FLANGE BRACING		NONE
STUD DEPTH	6.000 in	BRACING	Ly =	4.00 ft
STUD OC SPACING	40 in		Lt =	4.00 ft

FOUNDATION LINE LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
SERVICE LEVEL LOADS	3758	4838	215	0	0	0	758

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 10

ROOF DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	ROOF	RIGHT LOADING TYPE	ROOF
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 10 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	44	0	0	0	0	0	0

parapet

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	258	0	215	0	0	0	52
CENTERLINE OF WALL (plf)	75	0	0	0	0	0	15
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	377	0	215	0	0	0	67
TOTAL AXIAL LOAD (lb)	1255	0	717	0	0	0	224

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

ASD WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 62.67 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 10

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S250	68 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity	Mx,max ft-lb	Unity
D + L	1255	2580	2.056		0		0	
D + Lr	1972	4730	2.399		0		0	
D + 0.75L + 0.75Lr	1793	4193	2.339		0		0	
D + W	1255	2580	2.056	62.67	313		783	
D + 0.7E	1412	2944	2.086		0		0	
D + 0.75L + 0.75W + .75Lr	1793	4193	2.339	47.00	235		588	
D + 0.75L + 0.525E + .75Lr	1910	4466	2.338		0		0	
0.6D + W	753	1548	2.056	62.67	313		783	
0.6D - 0.7E	596	1184	1.985		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 7
Prb = 138 lb
y Brdg Rows = 2

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Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	None	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	NA
		Dead Load:	0 psf
Parapet Continuous:	Yes		
Parapet Porosity:	Porous	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:

Parapet Suction:	-43.27 psf
Parapet Pressure:	73.86 psf
Span Suction:	-22.91 psf
Span(1) Pressure:	22.44 psf

Opening Dead Load

Opening(1): -15 psf

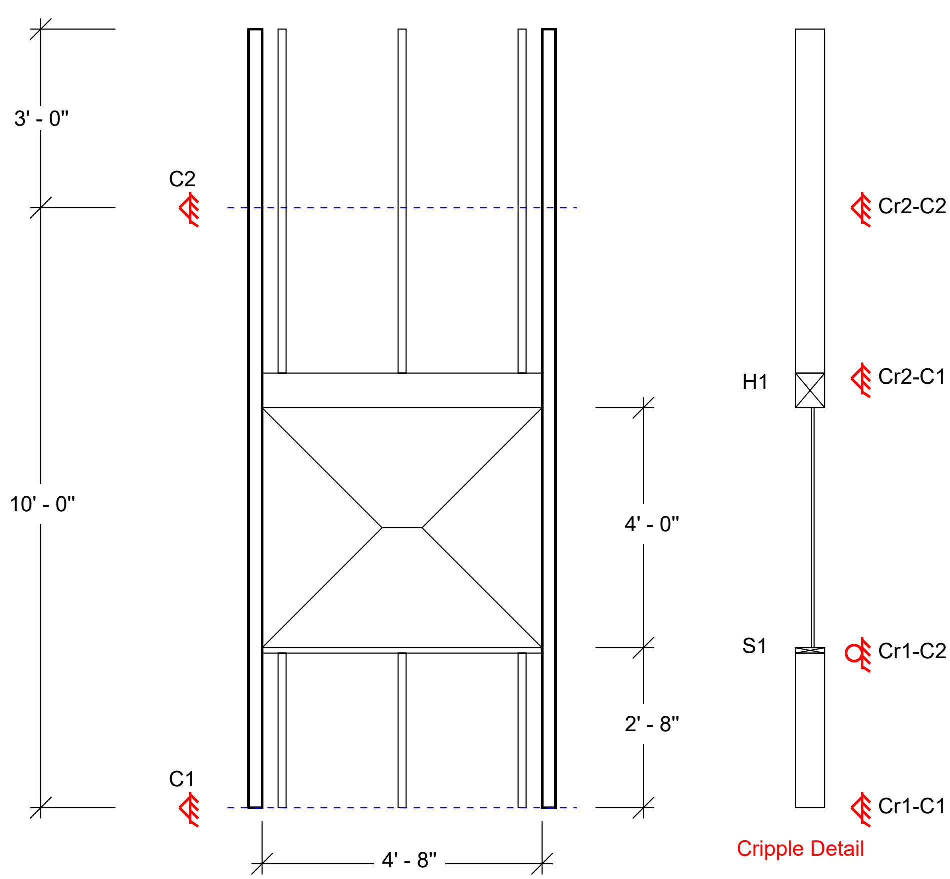
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-634.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-2739 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-634.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-2739 lb-in	No	Yes	No
Moment	Suction	Global Mz	NA	10.00 ft	-2838 lb-in	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-2838 lb-in	Yes	No	No

Design



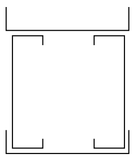
DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

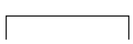
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-4033 lb-in	17147 lb-in	23.52%	2.33 ft	Pressure / OH	PASS
Vx_Top	-319 lbs	2728 lbs	11.71%	0.00 ft	Pressure / OH	PASS
VMx_Top	0.24	1	23.52%	2.23 ft	Pressure / OH	PASS
Ix_Top	0.197 in4	2.241 in4	8.80%	2.33 ft	Pressure / OH	PASS
Δx_Top	0.014 in	0.155 in	L/4091	2.33 ft	Pressure / OH	PASS
My	11374 lb-in	48471 lb-in	23.47%	2.33 ft	DL	PASS
Vy	1058 lbs	5645 lbs	18.74%	0.00 ft	DL	PASS
VMy	0.23	1	23.47%	2.23 ft	DL	PASS
Iy	0.769 in4	5.721 in4	13.45%	2.33 ft	DL	PASS
Δy	0.021 in	0.155 in	L/2677	2.33 ft	DL	PASS
Web Crippling	634 lbs	1394 lbs	45.49%	0.07 ft	DL	PASS
Web Crippling/Moment	0.39	1	39.24%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -319 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1058 lbs
4" L, 600T125-43 33 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 92% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

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Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	410	14.86%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs

Cripple Connection to Sill Track @ 15% Capacity

C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 24" O.C. - 23% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-7977 lb-in	16781 lb-in	47.54%	2.84 ft	Pressure / OH	PASS
M_stb	-7977 lb-in	15254 lb-in	52.29%	2.84 ft	Pressure / OH	PASS
M_dist	-7977 lb-in	13562 lb-in	58.82%	2.84 ft	Pressure / OH	PASS
V	443 lbs	1240 lbs	35.74%	2.84 ft	Pressure / OH	PASS
V/M	0.59	1	59.47%	2.84 ft	Pressure / OH	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.59	1	58.82%	2.84 ft	Pressure / OH	PASS
I_req	0.53 in4	2.316 in4	22.87%	5.84 ft	Pressure / OH	PASS
Span Δ	0.005 in	0.095 in	L/6271	1.70 ft	Pressure / OH	PASS
OH + Adj Span Δ	0.063 in	0.276 in	L/1574	5.84 ft	Pressure / OH	PASS

C2:	Wind:	Rx = -462 lbs	Rx = 741 lbs		Ry = 0 lbs

Reference Clip : H4: Level 10 - Test - Cr2.1-C2

C1:	Wind:	Rx = -170 lbs	Rx = 72 lbs		Ry = 0 lbs

Attach Track to Header using (2) Buildex #10-16 T3 @ 24" O.C. - 42% Capacity

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-10716 lb-in	16781 lb-in	63.86%	2.84 ft	Pressure / OH	PASS
M_stb	-10716 lb-in	15254 lb-in	70.25%	2.84 ft	Pressure / OH	PASS
M_dist	-10716 lb-in	13562 lb-in	79.01%	2.84 ft	Pressure / OH	PASS
V	443 lbs	1240 lbs	35.74%	2.84 ft	Pressure / OH	PASS
V/M	0.71	1	70.77%	2.84 ft	Pressure / OH	PASS
P	634 lbs	4060 lbs	15.62%	0.00 ft	DL	PASS
P/M	0.95	1	94.79%	2.84 ft	Pressure / OH	PASS
I_req	0.644 in4	2.316 in4	27.79%	5.84 ft	Pressure / OH	PASS
Span Δ	0.008 in	0.095 in	L/4532	1.70 ft	Pressure / OH	PASS
OH + Adj Span Δ	0.077 in	0.276 in	L/1295	5.84 ft	Pressure / OH	PASS

C2:	Wind:	Rx = -381 lbs	Rx = 821 lbs		Ry = 0 lbs

Reference Clip : H4: Level 10 - Test - Cr2.2-C2

C1:	Wind:	Rx = -251 lbs	Rx = 0 lbs		Ry = 634 lbs

Attach Track to Header using (2) Buildex #10-16 T3 @ 24" O.C. - 61% Capacity

DesignPro
Rigid Clip Designer Output
Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	H4: Level 10 - Test - Cr2.1-C2	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

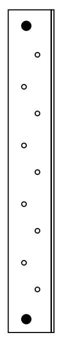
Inputs

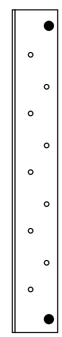
Connection Design:	Bypass	Clip:	**S681**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	68-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	0 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	43-33	Clip Thickness	68 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear: 914 lbs
Tension: 462 lbs
Compression: 741 lbs

Clip Design





Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	914 lbs	8467 lbs	11%	Pass
Clip Strong Moment	914 lbs	27473 lbs	3%	Pass
Clip Weak Bending	462 lbs	699 lbs	66%	Pass
Clip Axial Stress	0.694	1	69%	Pass
Clip Axial Shear Stress	0.494	1	49%	Pass
Clip Weak-Axis Deflection	462 lbs	1830 lbs	25%	Pass
Screw Shear	466 lbs	667 lbs	70%	Pass
Screw Tension	231 lbs	926 lbs	25%	Pass
Screw Shear-Tension	0.73	1	73%	Pass
Tilting/Bearing	466 lbs	805 lbs	58%	Pass
Pullout	231 lbs	284 lbs	81%	Pass
Pullover	231 lbs	362 lbs	64%	Pass
Tilting-Pullout	0.602	1	60%	Pass
Bearing-Pullover	0.161	1	16%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	914 lbs	7842 lbs	12%	Pass
Clip Moment	914 lbs	27473 lbs	3%	Pass
Clip Compression	741 lbs	2000 lbs	37%	Pass
Clip Tension	462 lbs	15499 lbs	3%	Pass
Clip Compression Stress	0.404	1	40%	Pass
Clip Comp.-Shear Stress	0.177	1	18%	Pass
Screw Shear	650 lbs	667 lbs	97%	Pass
Tilting/Bearing	650 lbs	805 lbs	81%	Pass

Selected Clip: (1) S681 with (2) Buildex #12-14 to L.S.F. and (2) Buildex #12-14 to 68-50 L.S.F. - 97% Capacity
(Factor of Safety of 10 for P.A.F.s and 5 for Anchor Bolts used for connections to structure.)

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	H4: Level 10 - Test - Cr2.2-C2	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Inputs

Connection Design:	Bypass	Clip:	**S681**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	68-50	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	0 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	43-33	Clip Thickness	68 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear:	914 lbs
Tension:	381 lbs
Compression:	821 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	**Actual**	**Allowable**	**Capacity**	**P/F**
Clip Shear	914 lbs	8467 lbs	11%	Pass
Clip Strong Moment	914 lbs	27473 lbs	3%	Pass
Clip Weak Bending	381 lbs	699 lbs	55%	Pass
Clip Axial Stress	0.578	1	58%	Pass
Clip Axial Shear Stress	0.346	1	35%	Pass
Clip Weak-Axis Deflection	381 lbs	1830 lbs	21%	Pass
Screw Shear	466 lbs	467 lbs	100%	Pass
Screw Tension	190 lbs	645 lbs	30%	Pass
Screw Shear-Tension	0.995	1	100%	Pass
Tilting/Bearing	466 lbs	755 lbs	62%	Pass
Pullout	190 lbs	249 lbs	76%	Pass
Pullover	190 lbs	362 lbs	53%	Pass
Tilting-Pullout	0.564	1	56%	Pass
Bearing-Pullover	0.133	1	13%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	**Actual**	**Allowable**	**Capacity**	**P/F**
Clip Shear	914 lbs	8114 lbs	11%	Pass
Clip Moment	914 lbs	38115 lbs	2%	Pass
Clip Compression	821 lbs	2038 lbs	40%	Pass
Clip Tension	381 lbs	16036 lbs	2%	Pass
Clip Compression Stress	0.427	1	43%	Pass
Clip Comp.-Shear Stress	0.195	1	19%	Pass
Screw Shear	338 lbs	467 lbs	72%	Pass
Tilting/Bearing	338 lbs	755 lbs	45%	Pass

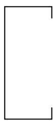
Selected Clip: (1) S681 with (4) Buildex #10-16 T3 to L.S.F. and (2) Buildex #10-16 T3 to 68-50 L.S.F. - 100% Capacity
(Factor of Safety of 10 for P.A.F.s and 5 for Anchor Bolts used for connections to structure.)

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Jamb Results



Punched Stud Member: (1) 600S250-68 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-12649 lb-in	41495 lb-in	30.48%	5.50 ft	Suction	PASS
M_stb	-12649 lb-in	24472 lb-in	51.69%	5.50 ft	Suction	PASS
M_dist	-12649 lb-in	39078 lb-in	32.37%	5.50 ft	Suction	PASS
V	-338 lbs	2879 lbs	11.74%	0.00 ft	Suction	PASS
V/M	0.30	1	30.48%	5.50 ft	Suction	PASS
P	1118 lbs	4553 lbs	24.56%	0.00 ft	DL	PASS
P/M	0.77	1	77.17%	5.50 ft	Suction	PASS
I_req	1.704 in4	4.724 in4	36.08%	13.00 ft	Suction	PASS
Span Δ	0.097 in	0.333 in	L/1240	5.00 ft	Suction	PASS
OH + Adj Span Δ	0.192 in	0.533 in	L/998	13.00 ft	Suction	PASS
Web Crippling	-338	1389	24.32%	C1	Suction	PASS

C2:	Wind:	Rx = -413 lbs	Rx = 325 lbs		Ry = 0 lbs

Reference Clip : H4: Level 10 - Test - C2

C1:	Wind:	Rx = -338 lbs	Rx = 224 lbs		Ry = 1118 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 64% Capacity

DesignPro
Rigid Clip Designer Output Version 6.0.2.0

ClarkDietrich. ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Clip:	H4: Level 10 - Test - C2	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:47 AM		

Inputs

Connection Design:	Bypass	Clip:	**S681**
Support Leg ..		Clip Loaded Leg Width:	1.5 in
Structure:	68-50 L.S.F.	Clip Support Leg Width:	1.5 in
Anchor/Structure Edge:	6 in		
Loaded Leg ..		Clip Quantity:	1
L.S.F. 1:	68-50	Clip Thickness	68 Mils
L.S.F. 2:	None	Clip Length:	11 in

Wind Pressure Reactions

Shear: 1118 lbs
Tension: 413 lbs
Compression: 325 lbs

Clip Design

Support Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1118 lbs	8467 lbs	13%	Pass
Clip Strong Moment	1118 lbs	38115 lbs	3%	Pass
Clip Weak Bending	413 lbs	932 lbs	44%	Pass
Clip Axial Stress	0.472	1	47%	Pass
Clip Axial Shear Stress	0.241	1	24%	Pass
Clip Weak-Axis Deflection	413 lbs	4338 lbs	10%	Pass
Screw Shear	287 lbs	667 lbs	43%	Pass
Screw Tension	103 lbs	926 lbs	11%	Pass
Screw Shear-Tension	0.416	1	42%	Pass
Tilting/Bearing	287 lbs	805 lbs	36%	Pass
Pullout	103 lbs	284 lbs	36%	Pass
Pullover	103 lbs	362 lbs	29%	Pass
Tilting-Pullout	0.269	1	27%	Pass
Bearing-Pullover	0.072	1	7%	Pass

Loaded Leg Design Results

Wind Pressure Reactions

Interaction Check	Actual	Allowable	Capacity	P/F
Clip Shear	1118 lbs	7842 lbs	14%	Pass
Clip Moment	1118 lbs	33860 lbs	3%	Pass
Clip Compression	325 lbs	2027 lbs	16%	Pass
Clip Tension	413 lbs	15499 lbs	3%	Pass
Clip Compression Stress	0.193	1	19%	Pass
Clip Comp.-Shear Stress	0.058	1	6%	Pass
Screw Shear	445 lbs	667 lbs	67%	Pass
Tilting/Bearing	445 lbs	805 lbs	55%	Pass

Selected Clip: (1) S681 with (3) Buildex #12-14 to L.S.F. and (4) Buildex #12-14 to 68-50 L.S.F. - 67% Capacity
(Manufacturer Catalog Factor of Safety for Fasteners used for connections to structure.)

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 9

10th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 9 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	527	0	215	0	0	0	106
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	752	538	215	0	0	0	152
TOTAL AXIAL LOAD (lb)	2508	1792	717	0	0	0	506

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 61.67 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 9

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S200	68 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	4299	7633	1.775		0		0	
D + Lr	3224	2258	0.700		0		0	
D + 0.75L + 0.75Lr	4389	6289	1.433		0		0	
D + W	2508	2258	0.900	61.67	308		771	
D + 0.7E	2862	2576	0.900		0		0	
D + 0.75L + 0.75W + .75Lr	4389	6289	1.433	46.25	231		578	
D + 0.75L + 0.525E + .75Lr	4654	6528	1.403		0		0	
0.6D + W	1505	1355	0.900	61.67	308		771	
0.6D - 0.7E	1150	1036	0.900		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 7
Prb = 326 lb
y Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:54 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

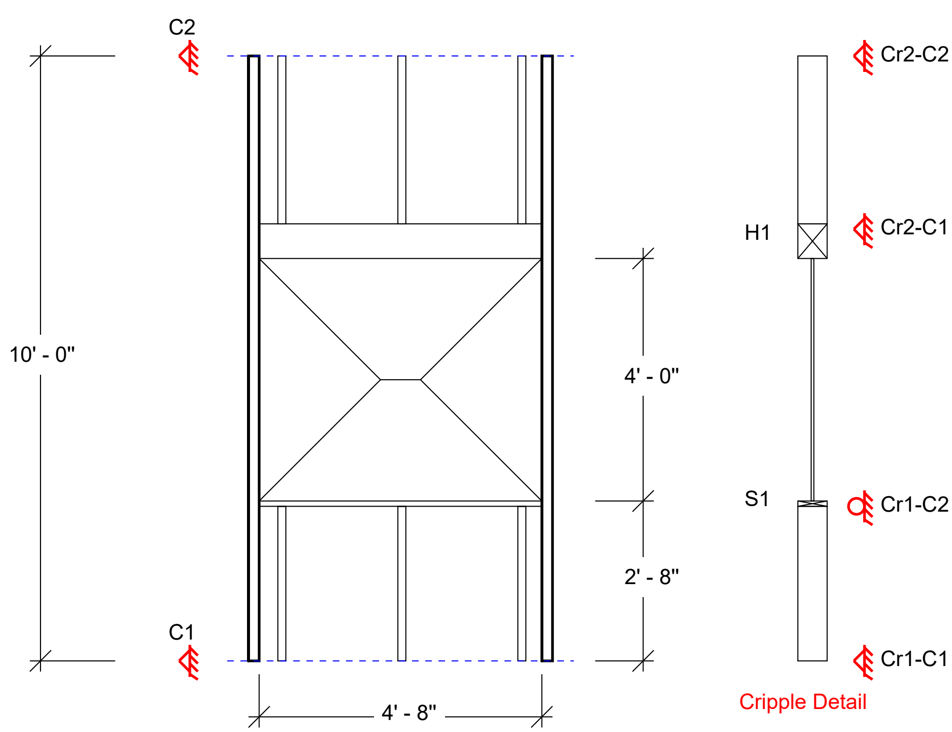
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-1972.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-1972.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-3780 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-3780 lb-in	No	Yes	No

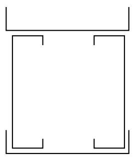
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:54 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (2) 600T125-54 50
Unpunched Gravity Member: (2) 600S162-54 50

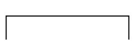
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3236 lb-in	17147 lb-in	18.87%	2.33 ft	Suction	PASS
Vx_Top	-274 lbs	2728 lbs	10.05%	0.00 ft	Suction	PASS
VMx_Top	0.19	1	18.88%	2.23 ft	Suction	PASS
Ix_Top	0.156 in4	2.241 in4	6.97%	2.33 ft	Suction	PASS
Δx_Top	0.011 in	0.155 in	L/5164	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -274 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 29% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:54 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	410	14.86%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs

Cripple Connection to Sill Track @ 15% Capacity

C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 43-33 L.S.F. at 24" O.C. - 23% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:54 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	410	15.87%	C2	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 24" O.C. - 12% Capacity

C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs

Attach Track to Header using (2) Buildex #10-16 T3 @ 24" O.C. - 16% Capacity

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-3780 lb-in	16781 lb-in	22.53%	2.84 ft	Pressure	PASS
M_stb	-3780 lb-in	15254 lb-in	24.78%	2.84 ft	Pressure	PASS
M_dist	-3780 lb-in	13562 lb-in	27.87%	2.84 ft	Pressure	PASS
V	-176 lbs	1240 lbs	14.19%	0.00 ft	Suction	PASS
V/M	0.27	1	26.58%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.53	1	53.11%	2.84 ft	Pressure	PASS
I_req	0.087 in4	2.316 in4	3.76%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/9586	1.56 ft	Suction	PASS
Web Crippling	175	410	42.68%	C2	Suction	PASS

C2:	Wind:	Rx = 46 lbs	Rx = 175 lbs		Ry = 0 lbs

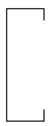
600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 24" O.C. - 33% Capacity

C1:	Wind:	Rx = -176 lbs	Rx = 0 lbs		Ry = 1021 lbs

Attach Track to Header using (2) Buildex #10-16 T3 @ 24" O.C. - 43% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 9:54 AM		

Jamb Results



Punched Stud Member: (1) 600S200-68 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-17434 lb-in	44384 lb-in	39.28%	6.66 ft	Suction	PASS
M_stb	-17434 lb-in	38793 lb-in	44.94%	6.66 ft	Suction	PASS
M_dist	-17434 lb-in	37000 lb-in	47.12%	6.66 ft	Suction	PASS
V	-401 lbs	2879 lbs	13.94%	0.00 ft	Suction	PASS
V/M	0.40	1	40.25%	7.16 ft	Suction	PASS
P	3736 lbs	9810 lbs	38.08%	0.00 ft	DL	PASS
P/M	0.89	1	88.90%	6.66 ft	Suction	PASS
I_req	1.826 in4	4.101 in4	44.54%	5.00 ft	Suction	PASS
Span Δ	0.148 in	0.333 in	L/808	5.00 ft	Suction	PASS
Web Crippling	-400	1389	28.79%	C2	Suction	PASS
Web Crippling	-401	1389	28.87%	C1	Suction	PASS

C2:	Wind:	Rx = -400 lbs	Rx = 259 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 37% Capacity

C1:	Wind:	Rx = -401 lbs	Rx = 236 lbs		Ry = 3736 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 76% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 8

9th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 8 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	902	538	215	0	0	0	182
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1128	1075	215	0	0	0	228
TOTAL AXIAL LOAD (lb)	3760	3583	717	0	0	0	759

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 60.33 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 8

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S350	68 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	7343	7633	1.039		0		0	
D + Lr	4477	2258	0.504		0		0	
D + 0.75L + 0.75Lr	6985	6289	0.900		0		0	
D + W	3760	2258	0.600	60.33	302		754	
D + 0.7E	4291	2576	0.600		0		0	
D + 0.75L + 0.75W + .75Lr	6985	6289	0.900	45.25	226		566	
D + 0.75L + 0.525E + .75Lr	7383	6528	0.884		0		0	
0.6D + W	2256	1355	0.600	60.33	302		754	
0.6D - 0.7E	1725	1036	0.600		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 443 lb
y Brdg Rows = 2

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:00 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

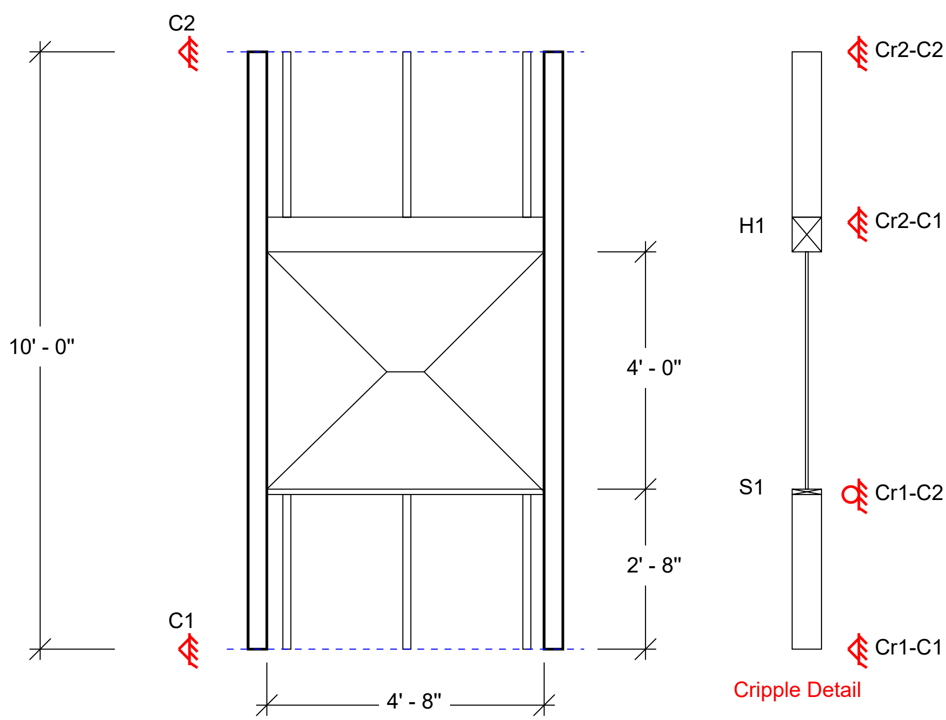
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-4654.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-4654.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design



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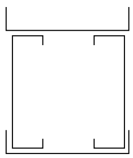
ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:00 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (2) 600T125-54 50
Unpunched Gravity Member: (2) 600S162-54 50

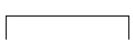
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-43 33 trk pc w/ (8) Buildex #10-16 T3 screws to Head, (8) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

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ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:00 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

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Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:00 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				

C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

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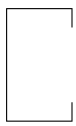
Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:00 AM		

Jamb Results



Punched Stud Member: (1) 600S350-68 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	53018 lb-in	34.56%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	53018 lb-in	34.56%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	49703 lb-in	36.86%	6.66 ft	Suction	PASS
V	428 lbs	2879 lbs	14.87%	10.00 ft	Suction	PASS
V/M	0.36	1	36.32%	7.16 ft	Suction	PASS
P	6418 lbs	14473 lbs	44.34%	0.00 ft	DL	PASS
P/M	0.85	1	84.62%	6.66 ft	Suction	PASS
I_req	1.903 in4	6.167 in4	30.85%	5.00 ft	Suction	PASS
Span Δ	0.103 in	0.333 in	L/1167	5.00 ft	Suction	PASS
Web Crippling	-428	1389	30.81%	C2	Suction	PASS
Web Crippling	-412	1389	29.67%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 6418 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 7

8th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 7 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	1278	1075	215	0	0	0	258
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1504	1613	215	0	0	0	303
TOTAL AXIAL LOAD (lb)	5013	5375	717	0	0	0	1011

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 59.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 7

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S250	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	10388	7633	0.735		0		0	
D + Lr	5729	2258	0.394		0		0	
D + 0.75L + 0.75Lr	9581	6289	0.656		0		0	
D + W	5013	2258	0.450	59.00	295		738	
D + 0.7E	5720	2576	0.450		0		0	
D + 0.75L + 0.75W + .75Lr	9581	6289	0.656	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	10112	6528	0.646		0		0	
0.6D + W	3008	1355	0.450	59.00	295		738	
0.6D - 0.7E	2300	1036	0.450		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 623 lb
y Brdg Rows = 2

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Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:04 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

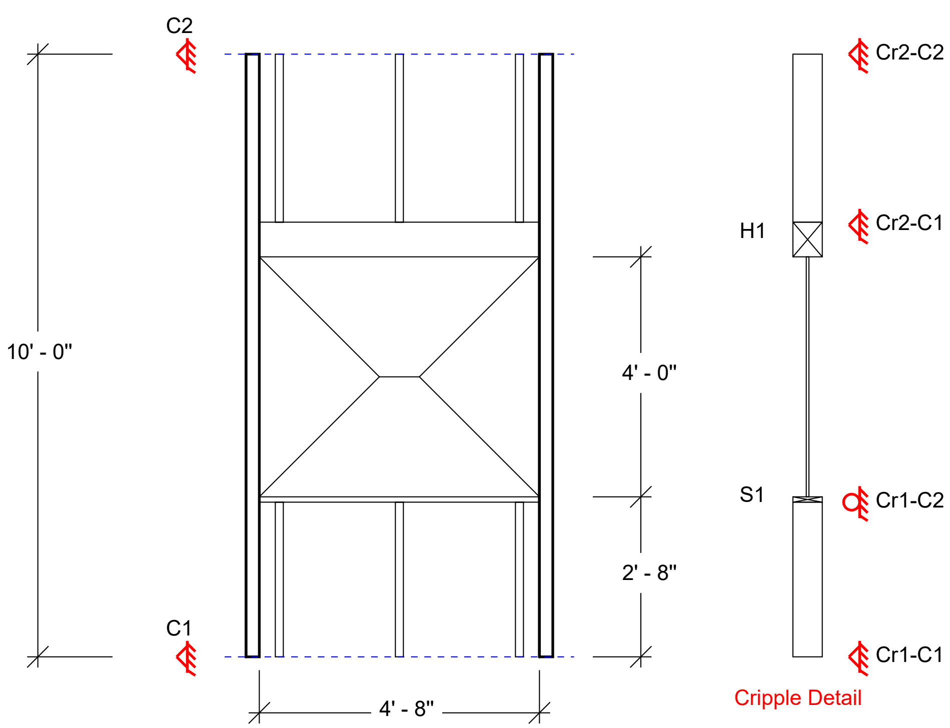
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-7383.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-7383.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

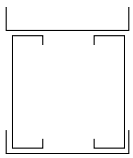
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:04 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

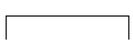
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.19%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:04 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 07 - Test	Phone Number:	678.304.5525
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Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

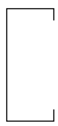
Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:04 AM		

Jamb Results



Punched Stud Member: (1) 600S250-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	69935 lb-in	26.20%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	62257 lb-in	29.43%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	61581 lb-in	29.75%	6.66 ft	Suction	PASS
V	428 lbs	3805 lbs	11.25%	10.00 ft	Suction	PASS
V/M	0.28	1	27.53%	7.16 ft	Suction	PASS
P	9147 lbs	17754 lbs	51.52%	0.00 ft	DL	PASS
P/M	0.85	1	85.29%	6.66 ft	Suction	PASS
I_req	1.903 in4	6.497 in4	29.28%	5.00 ft	Suction	PASS
Span Δ	0.098 in	0.333 in	L/1229	5.00 ft	Suction	PASS
Web Crippling	-428	2197	19.48%	C2	Suction	PASS
Web Crippling	-412	2197	18.77%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 9147 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 6

7th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 6 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	1654	1613	215	0	0	0	334
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	1880	2150	215	0	0	0	379
TOTAL AXIAL LOAD (lb)	6265	7167	717	0	0	0	1264

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 59.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 6

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	S300	97 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	13432	7633	0.568		0		0	
D + Lr	6982	2258	0.323		0		0	
D + 0.75L + 0.75Lr	12178	6289	0.516		0		0	
D + W	6265	2258	0.360	59.00	295		738	
D + 0.7E	7150	2576	0.360		0		0	
D + 0.75L + 0.75W + .75Lr	12178	6289	0.516	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	12841	6528	0.508		0		0	
0.6D + W	3759	1355	0.360	59.00	295		738	
0.6D - 0.7E	2874	1036	0.360		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 806 lb
y Brdg Rows = 2

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:06 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

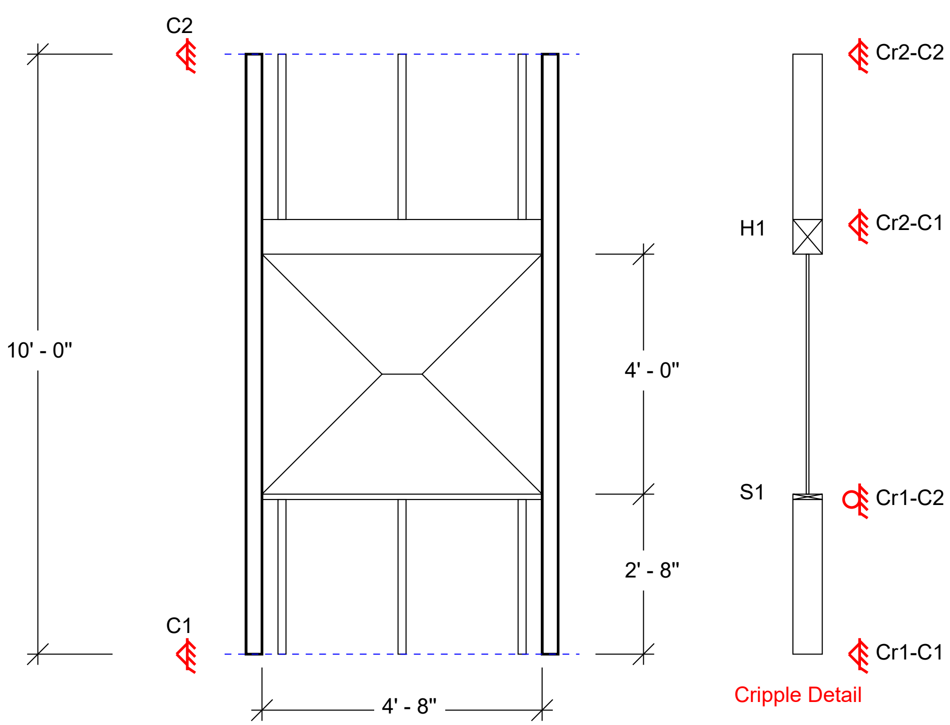
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-10388.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-10388.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design



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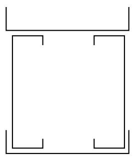
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:06 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

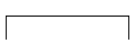
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:06 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:06 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

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Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:06 AM		

Jamb Results

Punched Stud Member: (1) 600S300-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	67292 lb-in	27.23%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	67292 lb-in	27.23%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	64684 lb-in	28.33%	6.66 ft	Suction	PASS
V	428 lbs	3805 lbs	11.25%	10.00 ft	Suction	PASS
V/M	0.28	1	28.48%	7.16 ft	Suction	PASS
P	12152 lbs	18943 lbs	64.15%	0.00 ft	DL	PASS
P/M	0.97	1	97.11%	6.66 ft	Suction	PASS
I_req	1.903 in4	7.281 in4	26.13%	5.00 ft	Suction	PASS
Span Δ	0.087 in	0.333 in	L/1378	5.00 ft	Suction	PASS
Web Crippling	-428	2197	19.48%	C2	Suction	PASS
Web Crippling	-412	2197	18.77%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 12152 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 5

6th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 5 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2030	2150	215	0	0	0	409
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	2255	2688	215	0	0	0	455
TOTAL AXIAL LOAD (lb)	7518	8958	717	0	0	0	1517

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

MWFRS PRESSURE 59.00 plf

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

ClarkDietrich ENGINEERING SERVICES		PROJECT NAME:	**CFS-NHERI 10 Story Test Portion**
		PROJECT NUMBER:	**2150200882**
		ENGINEER:	**L. Padgett** DATE: **10/29/2021**
2262 Rutherford Road, Suite 104	**Phone: (877) 832-3206**	CHECKER:	**LAP** DATE:
Carlsbad, California 92008	**www.ClarkDietrich.com**	SUBJECT:	**4'-8" EXT OPENING JOIST BEARING WALL**

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 5

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft

Ly = 4.00 ft

Lt = 4.00 ft

FLANGE BRACING NONE

1	**600**	**S350**	**97 (50)**				

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	16476	7633	0.463		0		0	
D + Lr	8234	2258	0.274		0		0	
D + 0.75L + 0.75Lr	14774	6289	0.426		0		0	
D + W	7518	2258	0.300	59.00	295		738	
D + 0.7E	8579	2576	0.300		0		0	
D + 0.75L + 0.75W + .75Lr	14774	6289	0.426	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	15570	6528	0.419		0		0	
0.6D + W	4511	1355	0.300	59.00	295		738	
0.6D - 0.7E	3449	1036	0.300		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6

Prb = 989 lb

y Brdg Rows = 2

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ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:08 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

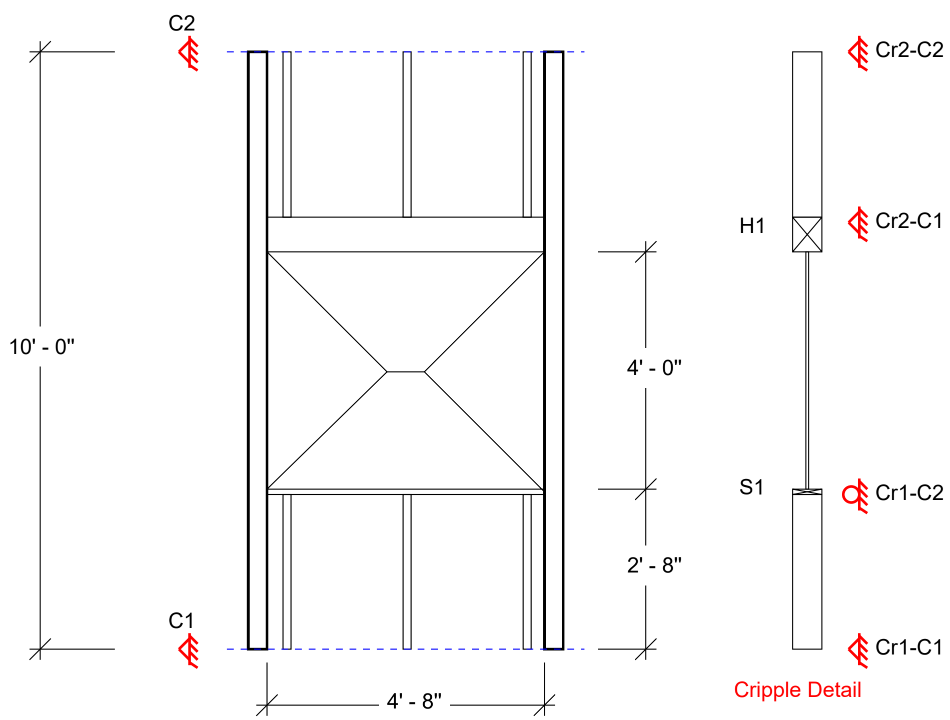
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-13432.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-13432.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design



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Opening:	H4: Level 05 - Test	Phone Number:	678.304.5525
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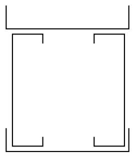
Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

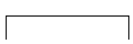
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

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ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:08 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
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Date/Time:	10/29/2021 / 10:08 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

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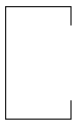
Opening:	H4: Level 05 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:08 AM		

Jamb Results



Punched Stud Member:	(1) 600S350-97 50
Track Member:	(0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	77650 lb-in	23.60%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	77650 lb-in	23.60%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	78371 lb-in	23.38%	6.66 ft	Suction	PASS
V	428 lbs	3805 lbs	11.25%	10.00 ft	Suction	PASS
V/M	0.25	1	25.14%	7.16 ft	Suction	PASS
P	15196 lbs	23364 lbs	65.04%	0.00 ft	DL	PASS
P/M	0.93	1	92.84%	6.66 ft	Suction	PASS
I_req	1.903 in4	8.632 in4	22.04%	5.00 ft	Suction	PASS
Span Δ	0.073 in	0.333 in	L/1633	5.00 ft	Suction	PASS
Web Crippling	-428	2197	19.48%	C2	Suction	PASS
Web Crippling	-412	2197	18.77%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 15196 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 4

5th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 4 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2405	2688	215	0	0	0	485
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	2631	3225	215	0	0	0	531
TOTAL AXIAL LOAD (lb)	8770	10750	717	0	0	0	1769

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 59.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

ClarkDietrich ENGINEERING SERVICES
2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

PROJECT NAME:	CFS-NHERI 10 Story Test Portion		
PROJECT NUMBER:	2150200882		
ENGINEER:	L. Padgett	DATE:	10/29/2021
CHECKER:	LAP	DATE:	
SUBJECT:	4'-8" EXT OPENING JOIST BEARING WALL		

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 4

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft FLANGE BRACING NONE
Ly = 4.00 ft
Lt = 4.00 ft

1	600	HDS300	97 (50)			

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	19520	7633	0.391		0		0	
D + Lr	9487	2258	0.238		0		0	
D + 0.75L + 0.75Lr	17370	6289	0.362		0		0	
D + W	8770	2258	0.257	59.00	295		738	
D + 0.7E	10009	2576	0.257		0		0	
D + 0.75L + 0.75W + .75Lr	17370	6289	0.362	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	18299	6528	0.357		0		0	
0.6D + W	5262	1355	0.257	59.00	295		738	
0.6D - 0.7E	4023	1036	0.257		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 1171 lb
y Brdg Rows = 2

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Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

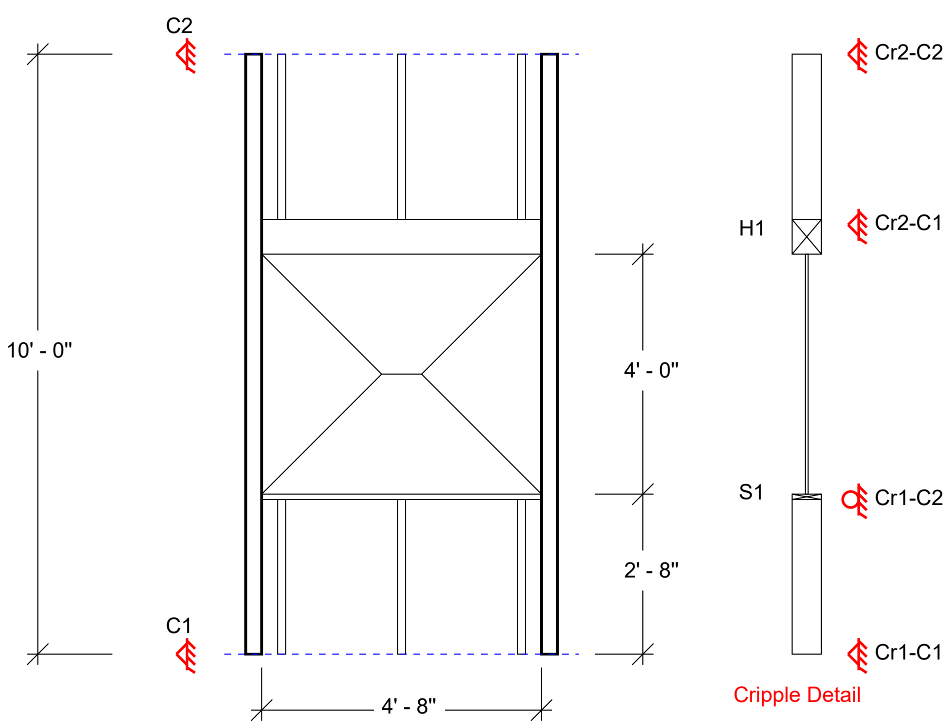
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-16476.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-16476.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design



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Head (H1) Design Results

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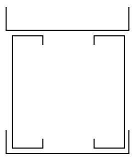

Track Member:	(2) 600T125-54 50
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Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
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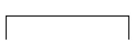
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
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Date/Time:	10/29/2021 / 10:11 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
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V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:11 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

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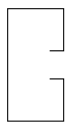
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 04 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:11 AM		

Jamb Results



Unpunched HDS Member: (1) 600HDS300-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	91817 lb-in	19.96%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	83195 lb-in	22.02%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	75993 lb-in	24.11%	6.66 ft	Suction	PASS
V	428 lbs	10471 lbs	4.09%	10.00 ft	Suction	PASS
V/M	0.20	1	19.97%	7.16 ft	Suction	PASS
P	18240 lbs	33236 lbs	54.88%	0.00 ft	DL	PASS
P/M	0.85	1	84.69%	6.66 ft	Suction	PASS
I_req	1.903 in4	8.336 in4	22.82%	5.00 ft	Suction	PASS
Span Δ	0.076 in	0.333 in	L/1577	5.00 ft	Suction	PASS
Web Crippling	-428	2197	19.48%	C2	Suction	PASS
Web Crippling	-412	2197	18.77%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 18240 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 3

4th FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 3 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	2781	3225	215	0	0	0	561
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3007	3763	215	0	0	0	607
TOTAL AXIAL LOAD (lb)	10023	12542	717	0	0	0	2022

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 59.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 3

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	HDS300	97 (50)			

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	22564	7633	0.338		0		0	
D + Lr	10739	2258	0.210		0		0	
D + 0.75L + 0.75Lr	19966	6289	0.315		0		0	
D + W	10023	2258	0.225	59.00	295		738	
D + 0.7E	11438	2576	0.225		0		0	
D + 0.75L + 0.75W + .75Lr	19966	6289	0.315	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	21028	6528	0.310		0		0	
0.6D + W	6014	1355	0.225	59.00	295		738	
0.6D - 0.7E	4598	1036	0.225		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 1354 lb
y Brdg Rows = 2

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ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:13 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

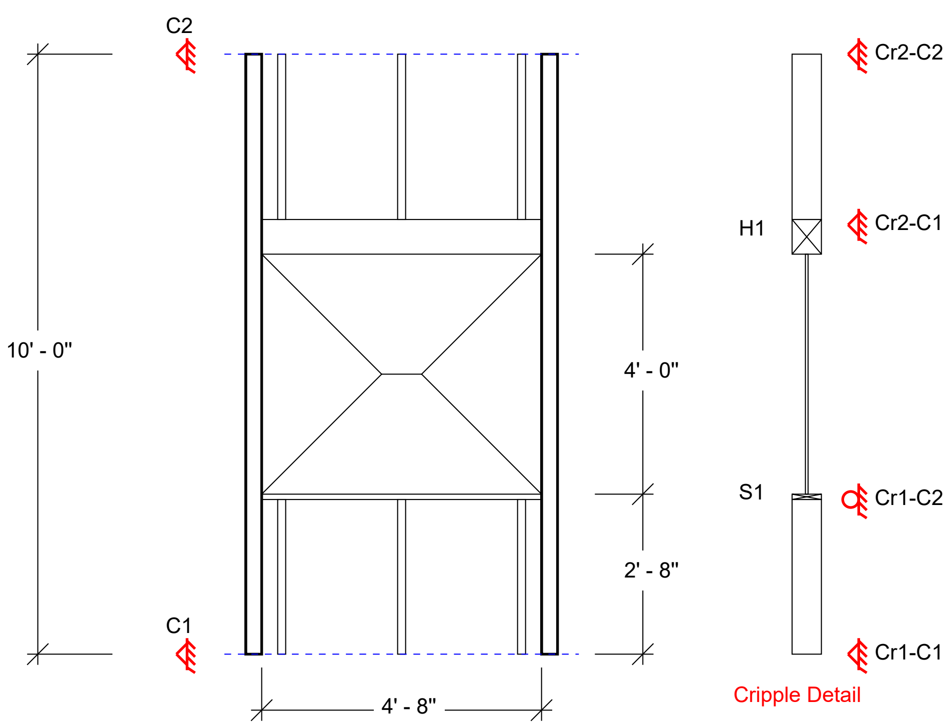
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-19520.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-19520.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design

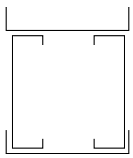


DesignPro
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:13 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

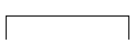
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:13 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:13 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

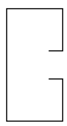
Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 03 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:13 AM		

Jamb Results



Unpunched HDS Member: (1) 600HDS300-97 50
Track Member: (0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	91817 lb-in	19.96%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	83195 lb-in	22.02%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	75993 lb-in	24.11%	6.66 ft	Suction	PASS
V	428 lbs	10471 lbs	4.09%	10.00 ft	Suction	PASS
V/M	0.20	1	19.97%	7.16 ft	Suction	PASS
P	21284 lbs	33236 lbs	64.04%	0.00 ft	DL	PASS
P/M	0.95	1	95.11%	6.66 ft	Suction	PASS
I_req	1.903 in4	8.336 in4	22.82%	5.00 ft	Suction	PASS
Span Δ	0.076 in	0.333 in	L/1577	5.00 ft	Suction	PASS
Web Crippling	-428	2197	19.48%	C2	Suction	PASS
Web Crippling	-412	2197	18.77%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 21284 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 2

3rd FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 2 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	3157	3763	215	0	0	0	637
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3383	4300	215	0	0	0	682
TOTAL AXIAL LOAD (lb)	11275	14333	717	0	0	0	2275

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA 33 sf

MWFRS PRESSURE 59.00 plf

Gcpi = 0.180

ZONE 4 GCp = -0.868
ZONE 5 GCp = -1.673

ZONE 4 P = -15.13 psf
w = -50.42 plf

ZONE 5 P = -26.74 psf
w = -89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 2

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	HDS300	97 (50)	&	600	S162	54 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	25608	7633	0.298		0		0	
D + Lr	11992	2258	0.188		0		0	
D + 0.75L + 0.75Lr	22563	6289	0.279		0		0	
D + W	11275	2258	0.200	59.00	295		738	
D + 0.7E	12867	2576	0.200		0		0	
D + 0.75L + 0.75W + .75Lr	22563	6289	0.279	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	23757	6528	0.275		0		0	
0.6D + W	6765	1355	0.200	59.00	295		738	
0.6D - 0.7E	5173	1036	0.200		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 1537 lb
y Brdg Rows = 2

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Opening Designer Output

Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:16 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

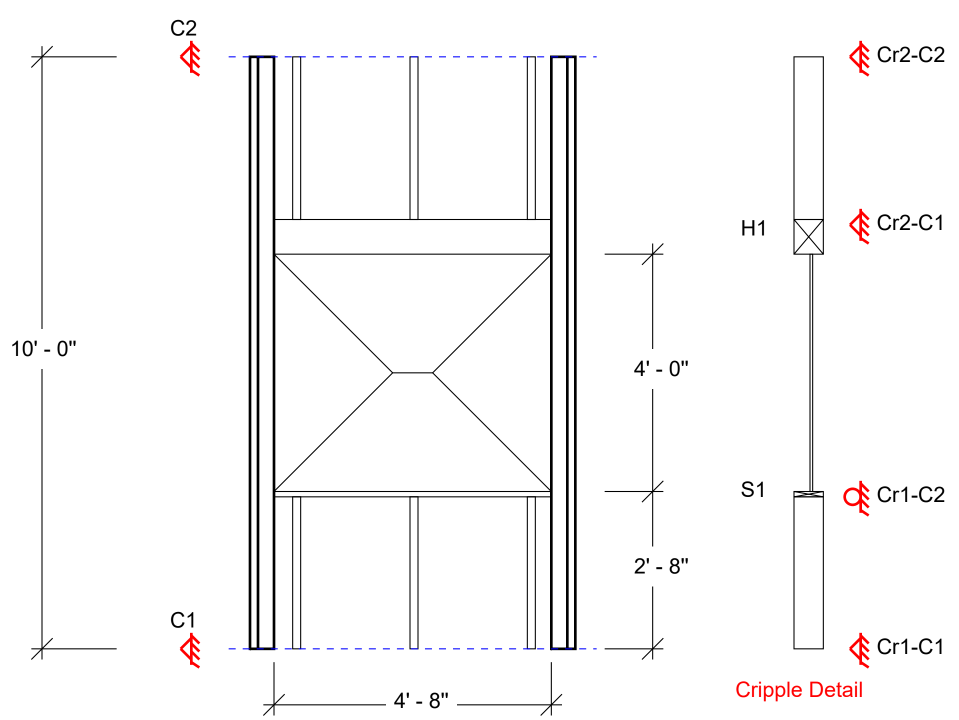
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-22564.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-22564.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

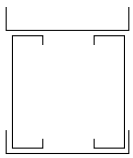
Design



Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:16 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (2) 600T125-54 50
Unpunched Gravity Member: (2) 600S162-54 50

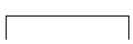
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:16 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

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Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:16 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

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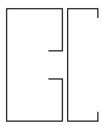
Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 02 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:16 AM		

Jamb Results



Unpunched HDS Member:	(1) 600HDS300-97 50
Punched Stud Member:	(1) 600S162-54 50
Track Member:	(0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	122530 lb-in	14.95%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	108120 lb-in	16.95%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	100229 lb-in	18.28%	6.66 ft	Suction	PASS
V	428 lbs	12418 lbs	3.45%	10.00 ft	Suction	PASS
V/M	0.15	1	15.03%	7.16 ft	Suction	PASS
P	24328 lbs	38963 lbs	62.44%	0.00 ft	DL	PASS
P/M	0.87	1	87.02%	6.66 ft	Suction	PASS
I_req	1.903 in4	11.197 in4	16.99%	5.00 ft	Suction	PASS
Span Δ	0.057 in	0.333 in	L/2118	5.00 ft	Suction	PASS
Web Crippling	-428	3127	13.69%	C2	Suction	PASS
Web Crippling	-412	3127	13.18%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 24328 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 1

2nd FLOOR DETAILS

LEFT SPAN LENGTH	21.50 ft	RIGHT SPAN	0.00 ft
LEFT LOADING TYPE	UNIT	RIGHT LOADING TYPE	UNIT
SPAN TYPE	SIMPLE SPAN	SPAN TYPE	SIMPLE SPAN
LINE LOAD MODIFIER	1.00	LINE LOAD MODIFIER	1.00

FLOOR SYSTEM DEPTH 12 in

LEVEL 1 WALL DETAILS

WALL TYPE	EXTERIOR WALL (EIFS)	DEPTH	6.000 in
STORY HEIGHT	10.00 ft	STUD OC SPACING:	40 in
WALL DL	150.0 plf	OC LOAD FACTOR	3.333
DEFLECTION LIMIT	L / 360		

USER SPECIFIED LOADS

	D	L	Lr	S	W		E
					DOWN (+)	UPLIFT (-)	
LINE LOAD (plf)	0	0	0	0	0	0	0

SERVICE AXIAL LOADS

	D	L	Lr	S	W (plf)		E
	plf	plf	plf	plf	DOWN (+)	UPLIFT (-)	plf
LEFT SIDE OF WALL (plf)	226	538	0	0	0	0	46
CENTERLINE OF WALL (plf)	3533	4300	215	0	0	0	713
RIGHT SIDE OF WALL (plf)	0	0	0	0	0	0	0
TOTAL LINE LOAD (plf)	3758	4838	215	0	0	0	758
TOTAL AXIAL LOAD (lb)	12528	16125	717	0	0	0	2528

**ROOF LIVE LOADS EXCEED SNOW LOADS AND WILL BE USED AS THE ROOF TRANSIENT*

WIND LATERAL LOADS

EFFECTIVE AREA	33 sf	MWFRS PRESSURE	59.00 plf	
Gcpi =	0.180	ZONE 4	P =	-15.13 psf
			w =	-50.42 plf
ZONE 4 GCp =	-0.868			
ZONE 5 GCp =	-1.673	ZONE 5	P =	-26.74 psf
			w =	-89.13 plf

4'-8" EXT OPENING JOIST BEARING WALL, LEVEL 1

MEMBER DESIGN PARAMETERS

Lx = 10.00 ft
Ly = 4.00 ft
Lt = 4.00 ft

FLANGE BRACING NONE

1	600	HDS300	97 (50)	&	600	S162	54 (50)

ASD LOAD COMBINATION Wasd	Axial lb	Ecc. Moment in-lb	ey in	Wind plf	Vy,max lb	Unity Check	Mx,max	Unity Check
D + L	28653	7633	0.266		0		0	
D + Lr	13244	2258	0.170		0		0	
D + 0.75L + 0.75Lr	25159	6289	0.250		0		0	
D + W	12528	2258	0.180	59.00	295		738	
D + 0.7E	14297	2576	0.180		0		0	
D + 0.75L + 0.75W + .75Lr	25159	6289	0.250	44.25	221		553	
D + 0.75L + 0.525E + .75Lr	26486	6528	0.246		0		0	
0.6D + W	7517	1355	0.180	59.00	295		738	
0.6D - 0.7E	5747	1036	0.180		0		0	
ZONE 4 BENDING				50.42	252		630	
ZONE 5 BENDING				89.13	446		1114	

SERVICEABILITY	Wind plf	Vy,max lb	Mx,max ft-lb	DEFLECTION		Unity Check
ZONE 4 DEFLECTION	35.29	176	441			
ZONE 5 DEFLECTION	62.39	312	780			

Brace Force (n studs) 6
Prb = 1719 lb
y Brdg Rows = 2

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Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:18 AM		

Inputs

Building Code:	CBC 2016	Wind Load Deflection Limit:	L/360
Wind Zone:	Typical	0.7 Wind Load Deflection Used:	Yes
Stud Spacing:	24" O.C.	Dead Load Deflection Limit:	L/360
Bracing Distance:	4' O.C. Max	Dead Load Deflection Limit (in):	0.5 in
z:	100 ft	Vertical Slip Allowance:	1 in
		Dead Load:	0 psf
Parapet Porosity:	NA	Under Hang Porosity:	NA

Wind Pressures

Typical Zone:
Span Suction: -22.91 psf
Span(1) Pressure: 22.56 psf

Opening Dead Load

Opening(1): -15 psf

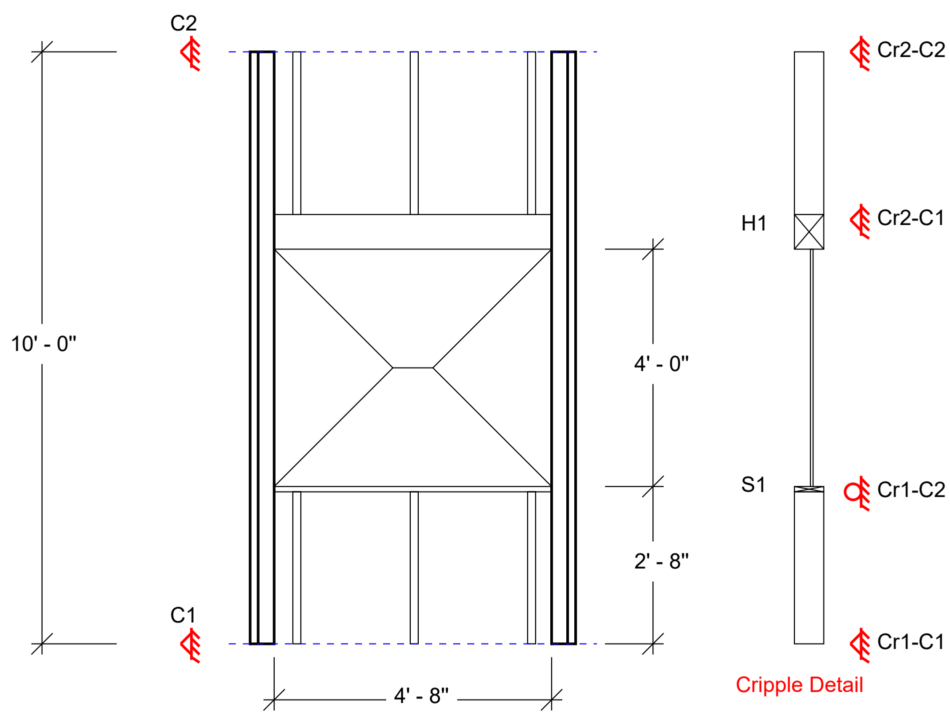
Add'l Head Dead Load

Head(1): 0 plf

Combination Loads

Load Type	Load Case	Direction	Location	Elevation	Load	To Jamb	To Cripple	To Lintel
Axial Point	Suction	Global FY	NA	10.00 ft	-25608.00 lbs	Yes	No	No
Moment	Suction	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Pressure	Global FY	NA	10.00 ft	-25608.00 lbs	Yes	No	No
Moment	Pressure	Global Mz	NA	10.00 ft	-4580 lb-in	Yes	No	No
Axial Point	Suction	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Suction	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No
Axial Point	Pressure	Global FY	24 in. O.C.	10.00 ft	-1021.00 lbs	No	Yes	No
Moment	Pressure	Global Mz	24 in. O.C.	10.00 ft	-4580 lb-in	No	Yes	No

Design



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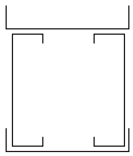
Opening Designer Output Version 6.0.2.0

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:18 AM		

Head (H1) Design Results

IMPORTANT NOTE: Head tracks must be continuous. Splicing of tracks is not allowed.



Track Member:	(2) 600T125-54 50
Unpunched Gravity Member:	(2) 600S162-54 50

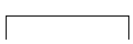
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx_Top	-3657 lb-in	17147 lb-in	21.33%	2.33 ft	Suction	PASS
Vx_Top	-313 lbs	2728 lbs	11.49%	0.00 ft	Suction	PASS
VMx_Top	0.21	1	21.33%	2.23 ft	Suction	PASS
Ix_Top	0.176 in4	2.241 in4	7.86%	2.33 ft	Suction	PASS
Δx_Top	0.012 in	0.155 in	L/4579	2.33 ft	Suction	PASS
My	18317 lb-in	48471 lb-in	37.79%	2.33 ft	DL	PASS
Vy	1704 lbs	5645 lbs	30.19%	0.00 ft	DL	PASS
VMy	0.38	1	37.79%	2.23 ft	DL	PASS
Iy	1.239 in4	5.721 in4	21.66%	2.33 ft	DL	PASS
Δy	0.034 in	0.155 in	L/1662	2.33 ft	DL	PASS
Web Crippling	1021 lbs	1394 lbs	73.25%	0.07 ft	DL	PASS
Web Crippling/Moment	0.63	1	63.11%	3.90 ft	Suction + DL	PASS
Mx_Bottom	-1313 lb-in	17147 lb-in	7.65%	2.33 ft	Suction	PASS
Vx_Bottom	-74 lbs	2728 lbs	2.72%	0.00 ft	Suction	PASS
VMx_Bottom	0.08	1	7.65%	2.22 ft	Suction	PASS
Ix_Bottom	0.063 in4	2.241 in4	2.82%	2.33 ft	Suction	PASS
Δx_Bottom	0.004 in	0.155 in	L/12750	2.33 ft	Suction	PASS

Box Header Clip Connection to Jamb: Rx(top) = -313 lbs Rx(bottom) = -74 lbs
(2) S545 w/ (2) Buildex #10-16 T3 screws to Head, (2) Buildex #10-16 T3 screws to Jamb - 33% Capacity

Box Header Track Connection to Jamb: Ry = 1704 lbs
4" L, 600T125-54 50 trk pc w/ (4) Buildex #10-16 T3 screws to Head, (4) Buildex #10-16 T3 screws to Jamb - 96% Capacity

Sill (S1) Design Results

IMPORTANT NOTE: Sill tracks must be continuous. Splicing of tracks is not allowed.



Track Member: (1) 600T125-43 33

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Mx	-2118 lb-in	9114 lb-in	23.25%	2.33 ft	Suction	PASS
Vx	-132 lbs	1377 lbs	9.58%	0.00 ft	Suction	PASS
VMx	0.23	1	23.25%	2.22 ft	Suction	PASS
Ix	0.103 in4	1.768 in4	5.85%	2.33 ft	Suction	PASS
Deflection	0.009 in	0.155 in	L/6157	2.33 ft	Suction	PASS

Sill Connection to Jamb: Rx = -132 lbs
(1) S545 w/ (2) Buildex #10-16 T3 screws to Sill, (2) Buildex #10-16 T3 screws to Jamb - 28% Capacity

DesignPro
Opening Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:18 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (1)						
M_str	-486 lb-in	16781 lb-in	2.90%	1.33 ft	Suction	PASS
M_stb	-486 lb-in	15254 lb-in	3.19%	1.33 ft	Suction	PASS
M_dist	-486 lb-in	13562 lb-in	3.59%	1.33 ft	Suction	PASS
V	61 lbs	1240 lbs	4.91%	2.66 ft	Suction	PASS
V/M	0.05	1	4.91%	2.66 ft	Suction	PASS
P	120 lbs	4132 lbs	2.90%	0.00 ft	DL	PASS
P/M	0.06	1	6.49%	1.33 ft	Suction	PASS
I_req	0.014 in4	2.316 in4	0.60%	1.33 ft	Suction	PASS
Span Δ	0.001 in	0.089 in	L/60357	1.33 ft	Suction	PASS
Web Crippling	-61	245	-24.87%	C2	Suction	PASS
Web Crippling	-61	269	-22.67%	C1	Suction	PASS

C2:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 0 lbs
	Connection:				
C1:	Wind:	Rx = -61 lbs	Rx = 60 lbs		Ry = 120 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:18 AM		

Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2)						
M_str	-554 lb-in	16781 lb-in	3.30%	1.42 ft	Suction	PASS
M_stb	-554 lb-in	15254 lb-in	3.63%	1.42 ft	Suction	PASS
M_dist	-554 lb-in	13562 lb-in	4.09%	1.42 ft	Suction	PASS
V	65 lbs	1240 lbs	5.25%	2.84 ft	Suction	PASS
V/M	0.05	1	5.25%	2.84 ft	Suction	PASS
P	0 lbs	4060 lbs	0.00%	--	DL	PASS
P/M	0.04	1	4.09%	1.42 ft	Suction	PASS
I_req	0.017 in4	2.316 in4	0.73%	1.42 ft	Suction	PASS
Span Δ	0.001 in	0.095 in	L/49593	1.42 ft	Suction	PASS
Web Crippling	-65	269	-24.20%	C2	Suction	PASS
Web Crippling	-65	269	-24.20%	C1	Suction	PASS

C2:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

C1:	Wind:	Rx = -65 lbs	Rx = 64 lbs		Ry = 0 lbs
	Connection:				

Non-Uniform Cripple Results

Punched Cripple Member: (1) 600S162-43 33 @ 24" O.C.

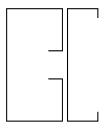
Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
Cripple (2.1)						
M_str	-4580 lb-in	16781 lb-in	27.29%	2.84 ft	Suction	PASS
M_stb	-4580 lb-in	15254 lb-in	30.02%	2.84 ft	Suction	PASS
M_dist	-4580 lb-in	13562 lb-in	33.77%	2.84 ft	Suction	PASS
V	-199 lbs	1240 lbs	16.08%	0.00 ft	Suction	PASS
V/M	0.32	1	31.64%	2.84 ft	Pressure	PASS
P	1021 lbs	4060 lbs	25.15%	0.00 ft	DL	PASS
P/M	0.59	1	59.03%	2.84 ft	Suction	PASS
I_req	0.102 in4	2.316 in4	4.40%	1.56 ft	Suction	PASS
Span Δ	0.004 in	0.095 in	L/8185	1.56 ft	Suction	PASS
Web Crippling	198	269	73.81%	C2	Pressure	PASS
Web Crippling	-199	269	-74.18%	C1	Suction	PASS

C2:	Wind:	Rx = 69 lbs	Rx = 198 lbs		Ry = 0 lbs
	Connection:				

C1:	Wind:	Rx = -199 lbs	Rx = 0 lbs		Ry = 1021 lbs
	Connection:				

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Opening:	H4: Level 01 - Test	Phone Number:	678.304.5525
Date/Time:	10/29/2021 / 10:18 AM		

Jamb Results



Unpunched HDS Member:	(1) 600HDS300-97 50
Punched Stud Member:	(1) 600S162-54 50
Track Member:	(0) None

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/FAIL
M_str	-18323 lb-in	122530 lb-in	14.95%	6.66 ft	Suction	PASS
M_stb	-18323 lb-in	108120 lb-in	16.95%	6.66 ft	Suction	PASS
M_dist	-18323 lb-in	100229 lb-in	18.28%	6.66 ft	Suction	PASS
V	428 lbs	12418 lbs	3.45%	10.00 ft	Suction	PASS
V/M	0.15	1	15.03%	7.16 ft	Suction	PASS
P	27372 lbs	38963 lbs	70.25%	0.00 ft	DL	PASS
P/M	0.96	1	95.96%	6.66 ft	Suction	PASS
I_req	1.903 in4	11.197 in4	16.99%	5.00 ft	Suction	PASS
Span Δ	0.057 in	0.333 in	L/2118	5.00 ft	Suction	PASS
Web Crippling	-428	3127	13.69%	C2	Suction	PASS
Web Crippling	-412	3127	13.18%	C1	Suction	PASS

C2:	Wind:	Rx = -428 lbs	Rx = 242 lbs		Ry = 0 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 54-50 L.S.F. at each Jamb - 40% Capacity

C1:	Wind:	Rx = -412 lbs	Rx = 229 lbs		Ry = 27372 lbs

600T125-54 50 ksi Track w/ (2) Buildex #10-16 T3 to 43-33 L.S.F. at each Jamb - 78% Capacity

LATERAL FORCE RESISTING SYSTEM

SW-1

ASD SEISMIC LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

NOTES

- R>3, AISI S400-15 Sheathed Shearwall, Blocked Sheet Steel Capacity from Recent Roger's Study.
- 33Ksi Sheet Steel, Fy must be less than 50 Ksi
- No Gypsum Sheathing (R=2)
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Governing locations GL D, Interior W3 Demising Wall, 315sf / 810sf - No Wind Design, compare to Archetype 913plf base shear

SHEAR WALL SUMMARY

HEIGHT ft	LEVEL	SHEATHING TYPE	FASTENER SPACING	MINIMUM STUD GAUGE	POST TYPE	BOTTOM ANCHORAGE	OPTIONAL SHEATHING
10.00	10	27 MIL STEEL (33Ksi)	6 / 12	18	Tension Rod System	Tension Rod System	
10.00	9	27 MIL STEEL (33Ksi)	6 / 12	18	Tension Rod System	Tension Rod System	
10.00	8	27 MIL STEEL (33Ksi)	4 / 12	18	Tension Rod System	Tension Rod System	
10.00	7	33 MIL STEEL (Blkg, #10) (33Ksi)	6 / 12	16	Tension Rod System	Tension Rod System	
10.00	6	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	
10.00	5	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	
10.00	4	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	16	Tension Rod System	Tension Rod System	
10.00	3	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	16	Tension Rod System	Tension Rod System	
10.00	2	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	16	Tension Rod System	Tension Rod System	
10.00	1	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	16	Tension Rod System	Tension Rod System	

ClarkDietrich ENGINEERING SERVICES	PROJECT NAME:	CFS-NHERI 10 Story Test Portion	
	PROJECT NUMBER:	2150200882	
	ENGINEER:	L. Padgett	DATE: 3/22/2022
2262 Rutherford Road, Suite 104 — Phone: (877) 832-3206	CHECKER:	LAP	DATE:
Carlsbad, California 92008 — www.ClarkDietrich.com	SUBJECT:	ASD Seismic LFRS Loading	

LATERAL FORCE RESISTING SYSTEM

SW-1

SEISMIC LOAD ANALYSIS

BUILDING BAY AREA: 315 sf
TOTAL BUILDING AREA: 810 sf
SAFETY FACTOR: 2.5 S400-15 E2.3.2

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

R — 4.17 k — 100.00
LRFD SHEAR= 810 lb 135 lb/ft
ASD SHEAR= 567 lb 94 lb/ft
#12 Trk - Trk Max Screw Spacing 24 in — 10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 1620 lb
TOTAL BAY SHEAR (Q_E) = 1620 lb
EXPECTED STRENGTH = 1941 lb/ft

10 — 6.57 k — 90.00
LRFD SHEAR= 2088 lb 348 lb/ft
ASD SHEAR= 1461 lb 244 lb/ft
#12 Trk - Trk Max Screw Spacing 14 in — 10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 2555 lb
TOTAL BAY SHEAR (Q_E) = 4175 lb
EXPECTED STRENGTH = 1941 lb/ft

9 — 5.80 k — 80.00
LRFD SHEAR= 3214 lb 536 lb/ft
ASD SHEAR= 2250 lb 375 lb/ft
#12 Trk - Trk Max Screw Spacing 9 in — 10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 2254 lb
TOTAL BAY SHEAR (Q_E) = 6429 lb
EXPECTED STRENGTH = 3000 lb/ft

8 — 5.03 k — 70.00
LRFD SHEAR= 4192 lb 699 lb/ft
ASD SHEAR= 2934 lb 489 lb/ft
#12 Trk - Trk Max Screw Spacing 14 in — 10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 1955 lb
TOTAL BAY SHEAR (Q_E) = 8384 lb
EXPECTED STRENGTH = 4095 lb/ft

7 — 4.26 k — 60.00
LRFD SHEAR= 5021 lb 837 lb/ft
ASD SHEAR= 3515 lb 586 lb/ft
#12 Trk - Trk Max Screw Spacing 12 in — 10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 1658 lb
TOTAL BAY SHEAR (Q_E) = 10042 lb
EXPECTED STRENGTH = 5139 lb/ft

6 — 3.51 k — 50.00
LRFD SHEAR= 5704 lb 951 lb/ft
ASD SHEAR= 3993 lb 665 lb/ft
#12 Trk - Trk Max Screw Spacing 10 in — 10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System
DIAPHRAGM SHEAR (Q_E) = 1365 lb
TOTAL BAY SHEAR (Q_E) = 11407 lb
EXPECTED STRENGTH = 5139 lb/ft

LATERAL FORCE RESISTING SYSTEM

SW-1

5
2.77 k → 10.00
LRFD SHEAR= 6242 lb 1040 lb/ft
ASD SHEAR= 4369 lb 728 lb/ft

#12 Trk - Trk Max Screw Spacing 9 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 1076 lb
TOTAL BAY SHEAR (Q_E) = 12484 lb
EXPECTED STRENGTH = 5886 lb/ft

4
2.04 k → 10.00
LRFD SHEAR= 6638 lb 1106 lb/ft
ASD SHEAR= 4646 lb 774 lb/ft

#12 Trk - Trk Max Screw Spacing 9 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 792 lb
TOTAL BAY SHEAR (Q_E) = 13276 lb
EXPECTED STRENGTH = 5886 lb/ft

3
1.32 k → 10.00
LRFD SHEAR= 6895 lb 1149 lb/ft
ASD SHEAR= 4826 lb 804 lb/ft

#12 Trk - Trk Max Screw Spacing 8 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 514 lb
TOTAL BAY SHEAR (Q_E) = 13790 lb
EXPECTED STRENGTH = 6330 lb/ft

2
0.63 k →
LRFD SHEAR= 7018 lb 1170 lb/ft
ASD SHEAR= 4912 lb 819 lb/ft

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 9 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 245 lb
TOTAL BAY SHEAR (Q_E) = 14035 lb
EXPECTED STRENGTH = 6330 lb/ft

1

ClarkDietrich
ENGINEERING SERVICES

2262 Rutherford Road, Suite 104 Phone: (877) 832-3206
Carlsbad, California 92008 www.ClarkDietrich.com

PROJECT NAME: **CFS-NHERI 10 Story Test Portion**
PROJECT NUMBER: **2150200882**
ENGINEER: **L. Padgett** DATE: **3/22/2022**
CHECKER: **LAP** DATE:
SUBJECT: **ASD Seismic LFRS Loading**

LATERAL FORCE RESISTING SYSTEM

SW-1

DESIGN SPECTRAL RESPONSE ACCELLERATION, SHORT PEF S_{DS} = 1.0088
SYSTEM OVERSTRENGTH FACTOR (TRANSVERSE DIRECTIOI Ω_0 = 3.0
REDUNDANCY FACTOR (TRANSVERSE DIRECTION) ρ = 1.0

INDIVIDUAL LOADS

		UNFACTORED ON-CENTER STUD LOADS			END-POST LOADS FROM HORIZONTAL LOADING	
HEIGHT ft	LEVEL	P_{DL} lb	P_{DL} FOR UPLIFT lb	P_{LL} lb	Q_E lb	EXPECTED STRENGTH lb
10.00	10	179	179	53	1350 1350	19410 19410
10.00	9	465	465	133	3479 4829	19410 38820
10.00	8	751	751	266	5357 10187	30000 68820
10.00	7	1036	1036	399	6986 17173	40950 109770
10.00	6	1322	1322	532	8368 25541	51390 161160
10.00	5	1608	1608	665	9506 35047	51390 212550
10.00	4	1894	1894	798	10403 45451	58860 271410
10.00	3	2180	2180	931	11063 56514	58860 271410
10.00	2	2466	2466	1064	11491 68005	63300 275850
10.00	1	2752	2752	1197	11696 79701	63300 334710
				Anchor LRFD Uplift=	-77224 lb	

GOVERNING LOADS
CONVERTED TO ASD

ASD END-POST AND HOLDOWN LOADS	
ASD Post Compression lb (FS=1.8)	ASD HD Tension lb (FS=3)
2419	-1308
8485	-4721
17710	-10012
29650	-16932
43894	-25234
60034	-34673
77669	-45010
96404	-56006
115853	-67431
135643	-79061

S100-12,
Section C4.1
FS=1.8 FS=3.0

PROJECT NAME:	CFS-NHERI 10 Story Test Portion		
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LATERAL FORCE RESISTING SYSTEM

SW-1

SEISMIC LOAD COMBINATION SUMMARY

		ASD END-POST LOADS FROM SEISMIC LOADING				NOMINAL END-POST LOADS FROM EXPECTED STRENGTH OR AMPLIFIED SEISMIC LOADING (Ω_0 Q_E)			
HEIGHT ft	LEVEL	CASE 5 [a] COMPRESS. lb	CASE 6 [b] COMPRESS. lb	GOVERNING COMPRESS. lb	CASE 8 [c] TENSION lb	CASE 5 [d] COMPRESS. lb	CASE 7 [e] TENSION lb	NOMINAL [f] COMPRESS. lb	NOMINAL [f] TENSION lb
10.00	10	1124	927	1124	-838	4354	-3925	4354	-3925
10.00	9	3845	3100	3845	-3101	15273	-14163	15273	-14163
10.00	8	7882	6299	7882	-6680	31879	-30036	31879	-30036
10.00	7	13057	10351	13057	-11400	53370	-50796	53370	-50796
10.00	6	19201	15130	19201	-17086	79009	-75701	79009	-75701
10.00	5	26141	20507	26141	-23568	108061	-104020	108061	-104020
10.00	4	33709	26354	33709	-30679	139805	-135029	139805	-135029
10.00	3	41740	32548	41740	-38252	173528	-168019	173528	-168019
10.00	2	50070	38967	50070	-46124	208536	-202293	208536	-202293
10.00	1	58543	45493	58543	-54140	244158	-237182	244158	-237182
					ASD			NOMINAL	

[a] FROM CASE 5, SECTION 2.4.1: $D + 0.7\ Q_E$
[b] FROM CASE 6, SECTION 2.4.1: $D + 0.75\ (0.7\ Q_E) + 0.75\ L$
[c] FROM CASE 8, SECTION 2.4.1: $0.6\ D - 0.7\ Q_E$
[d] FROM CASE 5, SECTION 12.4.3.2: $(1.2 + 0.2\ S_{DS})\ D + \Omega_0\ Q_E + L + 0.2S$
[e] FROM CASE 7, SECTION 12.4.3.2: (0.9 - 0.2 SDS) D - Ω0 Q_E +1.6H
[f] REQUIRED NOMINAL STRENGTH = LESSER OF EXPECTED STRENGTH OR OVERSTRENGTH AMPLIFIED SEISMIC

BASED ON AISI S400-15 SECTIONS E2.4.1.2, END-POSTS, HOLDOWNS, AND CONNECTIONS THAT ARE NOT PART OF THE ENERGY DISSIPATI SYSTEM (SHEATHING AND FASTENERS) MUST HAVE THE NOMINAL STRENGTH TO RESIST THE LESSER OF THE EXPECTED STRENGTH OR THE AMPLIFIED SEISMIC LOAD EFFECTS INCLUDING OVERSTRENGTH.

Q_E IS THE UNFACTORED COMPONENT FORCE RESULTING FROM A HORIZONTAL SEISMIC LOAD

SHEATHING IS EVALUATED BASED ON 0.7 Q_E COMPARED TO THE ALLOWABLE SHEATHING CAPACITY (NOMINAL SHEATHING CAPACITY DIVIDED BY Ω FACTOR OF SAFETY).

Sheathing Selection (See Reference Page)

ASD SHEAR DEMAND	NOMINAL DEMAND	NOMINAL CAPACITY	MAXIMUM ASPECT RATIO	ALLOWABLE ASPECT RATIO	ITEM #
94 lb/ft	236 lb/ft	647 lb/ft	1.667	2.000	18
244 lb/ft	609 lb/ft	647 lb/ft	1.667	2.000	18
375 lb/ft	938 lb/ft	1000 lb/ft	1.667	2.000	33
489 lb/ft	1223 lb/ft	1365 lb/ft	1.667	2.000	30
586 lb/ft	1464 lb/ft	1713 lb/ft	1.667	2.000	29
665 lb/ft	1664 lb/ft	1713 lb/ft	1.667	2.000	29
728 lb/ft	1821 lb/ft	1962 lb/ft	1.667	2.000	28
774 lb/ft	1936 lb/ft	1962 lb/ft	1.667	2.000	28
804 lb/ft	2011 lb/ft	2110 lb/ft	1.667	2.000	27
819 lb/ft	2047 lb/ft	2110 lb/ft	1.667	2.000	27

LATERAL FORCE RESISTING SYSTEM

SW-1

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

NOTES

- S240-15 Section B5.2, Blocked Sheet Steel Capacity from Recent Roger's Study.
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Governing locations GL D, W3 Demising Wall, 14' Trib Width
- Transverse wind approximately equivalent to the SW-1 and SW-3 Demising seismic is 63 mph Exp C = 5.7 windward psf + 1.6 leeward psf.

LATERAL FORCE RESISTING SYSTEM

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL — **TRANSVERSE DIRECTION**

ASD WIND LOAD ANALYSIS

BUILDING BAY SIZE: 14 ft — SHEAR WALL LENGTH: 6 ft

SAFETY FACTOR: 2.0 S240-15 B5.2.3 — QUANTITY PER BAY: 2

3.75 ft

R — 5.7 psf → 100.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 447 lb 75 lb/ft
DIAPHRAGM SHEAR = 894 lb
TOTAL SHEAR = 894 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 24 in
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 638 lb
POST COMPRESSION LOAD = 924 lb

10 — 5.7 psf → 90.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 958 lb 160 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 1916 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 21 in
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 2063 lb
POST COMPRESSION LOAD = 2807 lb

9 — 5.7 psf → 80.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 1469 lb 245 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 2938 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 14 in
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 4340 lb
POST COMPRESSION LOAD = 5542 lb

8 — 5.7 psf → 70.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 1980 lb 330 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 3960 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 21 in
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 7469 lb
POST COMPRESSION LOAD = 9127 lb

7 — 5.7 psf → 60.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 2491 lb 415 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 4982 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 16 in
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 11450 lb
POST COMPRESSION LOAD = 13565 lb

6 — 5.7 psf → 50.00 → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 3002 lb 500 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 6004 lb

10.00 ft — #12 Trk - Trk Max Screw Spacing 14 in
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 16281 lb
POST COMPRESSION LOAD = 18854 lb

LATERAL FORCE RESISTING SYSTEM

SW-1

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

5 — 40.00
5.7 psf → | → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 3513 lb 586 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 7026 lb

#12 Trk - Trk Max Screw Spacing 12 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 21965 lb
POST COMPRESSION LOAD = 24995 lb

4 — 30.00
5.7 psf → | → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 4024 lb 671 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 8048 lb

#12 Trk - Trk Max Screw Spacing 10 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 28500 lb
POST COMPRESSION LOAD = 31988 lb

3 — 20.00
5.7 psf → | → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 4535 lb 756 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 9070 lb

#12 Trk - Trk Max Screw Spacing 9 in
10.00 ft
SHEATHING: 2-side 27 MIL (UnBlk, #10)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 35887 lb
POST COMPRESSION LOAD = 39833 lb

2 — 10.00
5.7 psf → | → 1.6 psf
LRFD SHEAR=
ASD SHEAR= 5046 lb 841 lb/ft
DIAPHRAGM SHEAR = 1022 lb
TOTAL SHEAR = 10092 lb

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 9 in
10.00 ft
SHEATHING: 2-side 27 MIL (UnBlk, #10)
END POST: T.B.D.
ANCHORAGE: Tie-Down to Base Plate
POST TENSION LOAD = 44126 lb
POST COMPRESSION LOAD = 48529 lb

1

LATERAL FORCE RESISTING SYSTEM

SW-1

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL **TRANSVERSE DIRECTION**

		UNFACTORED GRAVITY LOADS AT BRACED WALL END-POST			END-POST LOAD (FROM WIND ONLY)	ASD LEVEL TENSION & COMPRESSION LOADS AT BRACED WALL END-POST			
HEIGHT	LEVEL	P_{DL}	P_{DL} FOR UPLIFT	P_{LL}		CASE 5 [a] COMPRESS.	CASE 6 [b] COMPRESS.	GOVERNING COMPRESS.	CASE 8 [c] TENSION
ft		lb	lb	lb	lb	lb	lb	lb	lb
10.00	10	179	179	53	745 745	924	778	924	-638
10.00	9	465	465	133	1597 2342	2807	2321	2807	-2063
10.00	8	751	751	266	2449 4791	5542	4543	5542	-4340
10.00	7	1036	1036	399	3300 8091	9127	7403	9127	-7469
10.00	6	1322	1322	532	4152 12243	13565	10903	13565	-11450
10.00	5	1608	1608	665	5004 17246	18854	15041	18854	-16281
10.00	4	1894	1894	798	5855 23101	24995	19819	24995	-21965
10.00	3	2180	2180	931	6707 29808	31988	25235	31988	-28500
10.00	2	2466	2466	1064	7559 37367	39833	31289	39833	-35887
10.00	1	2752	2752	1197	8410 45777	48529	37983	48529	-44126

Anchor LRFD Uplift = -73818 lb

ALL LOADS ARE EVALUATED BASED ON THE ALLOWABLE STRESS REQUIREMENTS OF ASCE 7.

[a] FROM CASE 5, SECTION 2.4.1: D + Wasd
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 Wasd + 0.75 L
[c] FROM CASE 7, SECTION 2.4.1: 0.6 D - Wasd

ClarkDietrich ENGINEERING SERVICES	PROJECT NAME:	CFS-NHERI 10 Story Test Portion
2262 Rutherford Road, Suite 104 Phone: (877) 832-3206	PROJECT NUMBER:	2150200882
Carlsbad, California 92008 www.ClarkDietrich.com	ENGINEER:	L. Padgett DATE: 3/22/2022
	CHECKER:	LAP DATE:
	SUBJECT:	ASD Seismic LFRS Loading

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD SEISMIC LOAD ANALYSIS ON SHEATHED SHEAR WALL **LONGITUDINAL DIRECTION**

NOTES

- R>3, AISI S400-15 Sheathed Shearwall, Blocked Sheet Steel Capacity from Recent Roger's Study.
- 33Ksi Sheet Steel, Fy must be less than 50 Ksi
- No Gypsum Sheathing (R=2)
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Exterior GL 1. Endpost compression and tension based on 2ft oc W1 studs. No wind design. Compare to Archetype base shear 761 plf

SHEAR WALL SUMMARY

HEIGHT ft	LEVEL	SHEATHING TYPE	FASTENER SPACING	MINIMUM STUD GAUGE	POST TYPE	BOTTOM ANCHORAGE	OPTIONAL SHEATHING
10.00	10	27 MIL STEEL (33Ksi)	6 / 12	18	600S250-43	S/PHD4	
10.00	9	27 MIL STEEL (33Ksi)	4 / 12	18	600HDS300-54	CD8	
10.00	8	27 MIL STEEL (33Ksi)	2 / 12	18	600HDS300-97	CD10	
10.00	7	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	(2) 600HDS300-68	(2) CD15	
10.00	6	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	16	HSS 6x6x3/16	1/4" x 5" A36 Plate	
10.00	5	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	16	HSS 6x6x3/16	3/8" x 5" A36 Plate	
10.00	4	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A36 Plate	
10.00	3	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A572 Gr50 P	
10.00	2	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A572 Gr50 P	
10.00	1	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	12	3/8" x 5" A36 Plate	Weld Direct to Transfe	

LATERAL FORCE RESISTING SYSTEM

SW-2

SEISMIC LOAD ANALYSIS

BUILDING BAY AREA: 383 sf
TOTAL BUILDING AREA: 810 sf
SAFETY FACTOR: 2.5 S400-15 E2.3.2

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

R — 4.17 k — 100.00
LRFD SHEAR= 984 lb 164 lb/ft
ASD SHEAR= 688 lb 115 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600S250-43
ANCHORAGE: S/PHD4
10.00 ft
#12 Trk - Trk Max Screw Spacing 24 in
DIAPHRAGM SHEAR (Q_E) = 1967 lb
TOTAL BAY SHEAR (Q_E) = 1967 lb
EXPECTED STRENGTH = 1941 lb/ft

10 — 6.57 k — 90.00
LRFD SHEAR= 2535 lb 422 lb/ft
ASD SHEAR= 1774 lb 296 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600HDS300-54
ANCHORAGE: CD8
10.00 ft
#12 Trk - Trk Max Screw Spacing 11 in
DIAPHRAGM SHEAR (Q_E) = 3103 lb
TOTAL BAY SHEAR (Q_E) = 5070 lb
EXPECTED STRENGTH = 3000 lb/ft

9 — 5.80 k — 80.00
LRFD SHEAR= 3903 lb 651 lb/ft
ASD SHEAR= 2732 lb 455 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600HDS300-97
ANCHORAGE: CD10
10.00 ft
#12 Trk - Trk Max Screw Spacing 15 in
DIAPHRAGM SHEAR (Q_E) = 2737 lb
TOTAL BAY SHEAR (Q_E) = 7807 lb
EXPECTED STRENGTH = 3510 lb/ft

8 — 5.03 k — 70.00
LRFD SHEAR= 5090 lb 848 lb/ft
ASD SHEAR= 3563 lb 594 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: (2) 600HDS300-68 MP1.8
ANCHORAGE: (2) CD15
10.00 ft
#12 Trk - Trk Max Screw Spacing 11 in
DIAPHRAGM SHEAR (Q_E) = 2374 lb
TOTAL BAY SHEAR (Q_E) = 10180 lb
EXPECTED STRENGTH = 5139 lb/ft

7 — 4.26 k — 60.00
LRFD SHEAR= 6097 lb 1016 lb/ft
ASD SHEAR= 4268 lb 711 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/16
ANCHORAGE: 1/4" x 5" A36 Plate
10.00 ft
#12 Trk - Trk Max Screw Spacing 10 in
DIAPHRAGM SHEAR (Q_E) = 2014 lb
TOTAL BAY SHEAR (Q_E) = 12194 lb
EXPECTED STRENGTH = 5886 lb/ft

6 — 3.51 k — 50.00
LRFD SHEAR= 6926 lb 1154 lb/ft
ASD SHEAR= 4848 lb 808 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/16
ANCHORAGE: 3/8" x 5" A36 Plate
10.00 ft
#12 Trk - Trk Max Screw Spacing 8 in
DIAPHRAGM SHEAR (Q_E) = 1658 lb
TOTAL BAY SHEAR (Q_E) = 13852 lb
EXPECTED STRENGTH = 6330 lb/ft

LATERAL FORCE RESISTING SYSTEM

SW-2

5
2.77 k →
10.00
LRFD SHEAR= 7579 lb 1263 lb/ft
ASD SHEAR= 5306 lb 884 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x1/4
ANCHORAGE: 1/2" x 5" A36 Plate
#12 Trk - Trk Max Screw Spacing
8 in
10.00 ft

DIAPHRAGM SHEAR (Q_E) = 1307 lb
TOTAL BAY SHEAR (Q_E) = 15159 lb
EXPECTED STRENGTH = 7392 lb/ft

4
2.04 k →
10.00
LRFD SHEAR= 8060 lb 1343 lb/ft
ASD SHEAR= 5642 lb 940 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x5/16
ANCHORAGE: 1/2" x 5" A572 Gr50 Plate
#12 Trk - Trk Max Screw Spacing
7 in
10.00 ft

DIAPHRAGM SHEAR (Q_E) = 962 lb
TOTAL BAY SHEAR (Q_E) = 16120 lb
EXPECTED STRENGTH = 7392 lb/ft

3
1.32 k →
10.00
LRFD SHEAR= 8372 lb 1395 lb/ft
ASD SHEAR= 5861 lb 977 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/8
ANCHORAGE: 1/2" x 5" A572 Gr50 Plate
#12 Trk - Trk Max Screw Spacing
7 in
10.00 ft

DIAPHRAGM SHEAR (Q_E) = 624 lb
TOTAL BAY SHEAR (Q_E) = 16745 lb
EXPECTED STRENGTH = 7392 lb/ft

2
0.63 k →
LRFD SHEAR= 8521 lb 1420 lb/ft
ASD SHEAR= 5965 lb 994 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x1/2
ANCHORAGE: Weld Direct to Transfer PL
3/8" x 2 1/2" Kwik-HUS-EZ= (600lb)
7 in
10.00 ft

DIAPHRAGM SHEAR (Q_E) = 298 lb
TOTAL BAY SHEAR (Q_E) = 17043 lb
EXPECTED STRENGTH = 8415 lb/ft

1

LATERAL FORCE RESISTING SYSTEM

SW-2

DESIGN SPECTRAL RESPONSE ACCELLERATION, SHORT PEF S_{DS} = 1.0088
SYSTEM OVERSTRENGTH FACTOR (LONGITUDINAL DIRECTIC Ω_0 = 3.0
REDUNDANCY FACTOR (LONGITUDINAL DIRECTION) ρ = 1.0

INDIVIDUAL LOADS

GOVERNING LOADS CONVERTED TO ASD

H-4 Ext Opening Jambs

		UNFACTORED ON-CENTER STUD LOADS			END-POST LOADS FROM HORIZONTAL LOADING		ASD END-POST AND HOLDOWN LOADS		
HEIGHT ft	LEVEL	P_{DL} lb	P_{DL} FOR UPLIFT lb	P_{LL} lb	Q_E lb	EXPECTED STRENGTH lb	ASD Post Compression lb (FS=1.8)	ASD HD Tension lb (FS=3)	
10.00	10	753	753	430	1639 1639	19410 19410	3557	-1464	
10.00	9	1505	1505	1075	4225 5864	30000 49410	11543	-5514	
10.00	8	2256	2256	2150	6505 12370	35100 84510	23567	-11844	
10.00	7	3008	3008	3225	8483 20853	51390 135900	38889	-20153	
10.00	6	3759	3759	4300	10162 31014	58860 194760	57007	-30140	HD Plate
10.00	5	4511	4511	5375	11543 42558	63300 258060	77429	-41508	HD Plate
10.00	4	5262	5262	6450	12632 55190	73920 331980	99664	-53965	HD Plate
10.00	3	6014	6014	7525	13434 68624	73920 331980	123237	-67224	HD Plate
10.00	2	6765	6765	8600	13954 82578	73920 331980	147675	-81003	HD Plate
10.00	1	7517	7517	9675	14202 96780	84150 416130	172529	-95030	HD Plate
				Anchor LRFD Uplift=	-90015 lb		S100-12, Section C4.1		
							FS=1.8	FS=3.0	

LATERAL FORCE RESISTING SYSTEM

SW-2

SEISMIC LOAD COMBINATION SUMMARY

		ASD END-POST LOADS FROM SEISMIC LOADING				NOMINAL END-POST LOADS FROM EXPECTED STRENGTH OR AMPLIFIED SEISMIC LOADING (Ω_0 Q_E)			
HEIGHT ft	LEVEL	CASE 5 [a] COMPRESS. lb	CASE 6 [b] COMPRESS. lb	GOVERNING COMPRESS. lb	CASE 8 [c] TENSION lb	CASE 5 [d] COMPRESS. lb	CASE 7 [e] TENSION lb	NOMINAL [f] COMPRESS. lb	NOMINAL [f] TENSION lb
10.00	10	1900	1936	1936	-696	6403	-4392	6403	-4392
10.00	9	5610	5390	5610	-3202	20777	-16541	20777	-16541
10.00	8	10915	10363	10915	-7305	42421	-35533	42421	-35533
10.00	7	17605	16375	17605	-12792	70000	-60458	70000	-60458
10.00	6	25469	23267	25469	-19455	102613	-90419	102613	-90419
10.00	5	34301	30885	34301	-27084	139371	-124523	139371	-124523
10.00	4	43895	39074	43895	-35476	179396	-161896	179396	-161896
10.00	3	54051	47685	54051	-44428	221826	-201672	221826	-201672
10.00	2	64569	56568	64569	-53745	265816	-243009	265816	-243009
10.00	1	75263	65583	75263	-63236	310552	-285091	310552	-285091
					ASD			NOMINAL	

[a] FROM CASE 5, SECTION 2.4.1: D + 0.7 Q_E
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 (0.7 Q_E) + 0.75 L
[c] FROM CASE 8, SECTION 2.4.1: 0.6 D - 0.7 Q_E
[d] FROM CASE 5, SECTION 12.4.3.2: $(1.2 + 0.2\ S_{DS})\ D + \Omega_0\ Q_E + L + 0.2S$
[e] FROM CASE 7, SECTION 12.4.3.2: (0.9 - 0.2 SDS) D - Ω0 Q_E +1.6H
[f] REQUIRED NOMINAL STRENGTH = LESSER OF EXPECTED STRENGTH OR OVERSTRENGTH AMPLIFIED SEISMIC

BASED ON AISI S400-15 SECTIONS E2.4.1.2, END-POSTS, HOLDOWNS, AND CONNECTIONS THAT ARE NOT PART OF THE ENERGY DISSIPATI SYSTEM (SHEATHING AND FASTENERS) MUST HAVE THE NOMINAL STRENGTH TO RESIST THE LESSER OF THE EXPECTED STRENGTH OR THE AMPLIFIED SEISMIC LOAD EFFECTS INCLUDING OVERSTRENGTH.
Q_E IS THE UNFACTORED COMPONENT FORCE RESULTING FROM A HORIZONTAL SEISMIC LOAD
SHEATHING IS EVALUATED BASED ON 0.7 Q_E COMPARED TO THE ALLOWABLE SHEATHING CAPACITY (NOMINAL SHEATHING CAPACITY DIVIDED BY Ω FACTOR OF SAFETY).

Sheathing Selection (See Reference Page)

ASD SHEAR DEMAND	NOMINAL DEMAND	NOMINAL CAPACITY	MAXIMUM ASPECT RATIO	ALLOWABLE ASPECT RATIO	ITEM #
115 lb/ft	287 lb/ft	647 lb/ft	1.667	2.000	18
296 lb/ft	739 lb/ft	1000 lb/ft	1.667	2.000	33
455 lb/ft	1138 lb/ft	1170 lb/ft	1.667	2.000	31
594 lb/ft	1485 lb/ft	1713 lb/ft	1.667	2.000	29
711 lb/ft	1778 lb/ft	1962 lb/ft	1.667	2.000	28
808 lb/ft	2020 lb/ft	2110 lb/ft	1.667	2.000	27
884 lb/ft	2211 lb/ft	2464 lb/ft	1.667	2.000	26
940 lb/ft	2351 lb/ft	2464 lb/ft	1.667	2.000	26
977 lb/ft	2442 lb/ft	2464 lb/ft	1.667	2.000	26
994 lb/ft	2485 lb/ft	2805 lb/ft	1.667	2.000	25

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

NOTES

- S240-15 Section B5.2, Blocked Sheet Steel Capacity from Recent Roger's Study.
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Exterior GL 1 between wall openings. Endpost compression and tension based on 2ft oc W1 studs.
- Longitude wind approximately equivalent to the seismic is 75 mph Exposure C, 8 windward psf + 2.4 leeward psf.

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

ASD WIND LOAD ANALYSIS

BUILDING BAY SIZE: 11.25 ft
SAFETY FACTOR: 2.0   S240-15 B5.2.3

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

3.75 ft

R
8.0 psf → 100.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 507 lb   84 lb/ft
DIAPHRAGM SHEAR = 1014 lb
TOTAL SHEAR = 1014 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 393 lb
POST COMPRESSION LOAD = 2426 lb

10
8.0 psf → 90.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 1086 lb   181 lb/ft
DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 2173 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 1752 lb
POST COMPRESSION LOAD = 5844 lb

9
8.0 psf → 80.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 1666 lb   278 lb/ft
DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 3331 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 4078 lb
POST COMPRESSION LOAD = 10521 lb

8
8.0 psf → 70.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 2245 lb   374 lb/ft
DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 4490 lb

#12 Trk - Trk Max Screw Spacing 18 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 7369 lb
POST COMPRESSION LOAD = 15924 lb

7
8.0 psf → 60.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 2824 lb   471 lb/ft
DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 5649 lb

#12 Trk - Trk Max Screw Spacing 15 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 11625 lb
POST COMPRESSION LOAD = 22051 lb

6
8.0 psf → 50.00 → 2.3 psf
LRFD SHEAR=
ASD SHEAR= 3404 lb   567 lb/ft
DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 6808 lb

#12 Trk - Trk Max Screw Spacing 12 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 16847 lb
POST COMPRESSION LOAD = 28902 lb

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

5
8.0 psf → 40.00 → 2.3 psf

LRFD SHEAR=
ASD SHEAR= 3983 lb   664 lb/ft

DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 7966 lb

#12 Trk - Trk Max Screw Spacing
10 in

10.00 ft

SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:

POST TENSION LOAD = 23035 lb
POST COMPRESSION LOAD = 36477 lb

4
8.0 psf → 30.00 → 2.3 psf

LRFD SHEAR=
ASD SHEAR= 4563 lb   760 lb/ft

DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 9125 lb

#12 Trk - Trk Max Screw Spacing
9 in

10.00 ft

SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:

POST TENSION LOAD = 30188 lb
POST COMPRESSION LOAD = 44777 lb

3
8.0 psf → 20.00 → 2.3 psf

LRFD SHEAR=
ASD SHEAR= 5142 lb   857 lb/ft

DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 10284 lb

#12 Trk - Trk Max Screw Spacing
8 in

10.00 ft

SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:

POST TENSION LOAD = 38308 lb
POST COMPRESSION LOAD = 53800 lb

2
8.0 psf → 10.00 → 2.3 psf

LRFD SHEAR=
ASD SHEAR= 5721 lb   954 lb/ft

DIAPHRAGM SHEAR = 1159 lb
TOTAL SHEAR = 11443 lb

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb)
8 in

10.00 ft

SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:

POST TENSION LOAD = 47392 lb
POST COMPRESSION LOAD = 64430 lb

1

<u>LATERAL FORCE RESISTING SYSTEM</u> SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL — LONGITUDINAL DIRECTION

		UNFACTORED GRAVITY LOADS AT BRACED WALL END-POST			END-POST LOAD (FROM WIND ONLY)	ASD LEVEL TENSION & COMPRESSION LOADS AT BRACED WALL END-POST			
HEIGHT	LEVEL	P_{DL}	P_{DL} FOR UPLIFT	P_{LL}		CASE 5 [a] COMPRESS.	CASE 6 [b] COMPRESS.	GOVERNING COMPRESS.	CASE 8 [c] TENSION
ft		lb	lb	lb	lb	lb	lb	lb	lb
10.00	10	1255	753	717	845 845	2100	2426	2426	-393
10.00	9	2508	1505	1792	1811 2655	5163	5844	5844	-1752
10.00	8	3760	2256	3583	2776 5432	9192	10521	10521	-4078
10.00	7	5013	3008	5375	3742 9173	14186	15924	15924	-7369
10.00	6	6265	3759	7167	4707 13881	20146	22051	22051	-11625
10.00	5	7518	4511	8958	5673 19554	27072	28902	28902	-16847
10.00	4	8770	5262	10750	6639 26193	34963	36477	36477	-23035
10.00	3	10023	6014	12542	7604 33797	43820	44777	44777	-30188
10.00	2	11275	6765	14333	8570 42367	53642	53800	53800	-38308
10.00	1	12528	7517	16125	9536 51902	64430	63549	64430	-47392

Anchor LRFD Uplift = -79739 lb

ALL LOADS ARE EVALUATED BASED ON THE ALLOWABLE STRESS REQUIREMENTS OF ASCE 7.

[a] FROM CASE 5, SECTION 2.4.1: D + Wasd
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 Wasd + 0.75 L
[c] FROM CASE 7, SECTION 2.4.1: 0.6 D - Wasd

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD SEISMIC LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

NOTES

- R>3, AISI S400-15 Sheathed Shearwall, Blocked Sheet Steel Capacity from Recent Roger's Study.
- 33Ksi Sheet Steel, Fy must be less than 50 Ksi
- No Gypsum Sheathing (R=2)
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Corridor GL 2. Endpost compression and tension based on 2ft oc W5 studs - No wind design, compare to archetype base shear 976 plf

SHEAR WALL SUMMARY

HEIGHT ft	LEVEL	SHEATHING TYPE	FASTENER SPACING	MINIMUM STUD GAUGE	POST TYPE	BOTTOM ANCHORAGE	OPTIONAL SHEATHING
10.00	10	27 MIL STEEL (33Ksi)	6 / 12	18	600S250-43	S/PHD4	
10.00	9	27 MIL STEEL (33Ksi)	4 / 12	18	600HDS300-54	CD8	
10.00	8	27 MIL STEEL (33Ksi)	2 / 12	18	600HDS300-97	CD10	
10.00	7	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	(2) 600HDS300-68	(2) CD15	
10.00	6	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	16	HSS 6x6x3/16	1/4" x 5" A36 Plate	
10.00	5	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	16	HSS 6x6x3/16	3/8" x 5" A36 Plate	
10.00	4	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A36 Plate	
10.00	3	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A572 Gr50 P	
10.00	2	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	14	HSS 6x6x3/16	1/2" x 5" A572 Gr50 P	
10.00	1	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	12	3/8" x 5" A36 Plate	Weld Direct to Transfe	

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PROJECT NAME:	**CFS-NHERI 10 Story Test Portion**		
PROJECT NUMBER:	**2150200882**		
ENGINEER:	**L. Padgett**	DATE:	**3/22/2022**
CHECKER:	**LAP**	DATE:	
SUBJECT:	**ASD Seismic LFRS Loading**		

LATERAL FORCE RESISTING SYSTEM

SW-2

SEISMIC LOAD ANALYSIS

BUILDING BAY AREA: 383 sf
TOTAL BUILDING AREA: 810 sf
SAFETY FACTOR: 2.5 S400-15 E2.3.2

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

R — 4.17 k — 100.00
LRFD SHEAR= 984 lb 164 lb/ft
ASD SHEAR= 688 lb 115 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600S250-43
ANCHORAGE: S/PHD4
#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 1967 lb
TOTAL BAY SHEAR (Q_E) = 1967 lb
EXPECTED STRENGTH = 1941 lb/ft

10 — 6.57 k — 90.00
LRFD SHEAR= 2535 lb 422 lb/ft
ASD SHEAR= 1774 lb 296 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600HDS300-54
ANCHORAGE: CD8
#12 Trk - Trk Max Screw Spacing 11 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 3103 lb
TOTAL BAY SHEAR (Q_E) = 5070 lb
EXPECTED STRENGTH = 3000 lb/ft

9 — 5.80 k — 80.00
LRFD SHEAR= 3903 lb 651 lb/ft
ASD SHEAR= 2732 lb 455 lb/ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: 600HDS300-97
ANCHORAGE: CD10
#12 Trk - Trk Max Screw Spacing 7 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 2737 lb
TOTAL BAY SHEAR (Q_E) = 7807 lb
EXPECTED STRENGTH = 3510 lb/ft

8 — 5.03 k — 70.00
LRFD SHEAR= 5090 lb 848 lb/ft
ASD SHEAR= 3563 lb 594 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: (2) 600HDS300-68
ANCHORAGE: (2) CD15
#12 Trk - Trk Max Screw Spacing 11 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 2374 lb
TOTAL BAY SHEAR (Q_E) = 10180 lb
EXPECTED STRENGTH = 5139 lb/ft

7 — 4.26 k — 60.00
LRFD SHEAR= 6097 lb 1016 lb/ft
ASD SHEAR= 4268 lb 711 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/16
ANCHORAGE: 1/4" x 5" A36 Plate
#12 Trk - Trk Max Screw Spacing 10 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 2014 lb
TOTAL BAY SHEAR (Q_E) = 12194 lb
EXPECTED STRENGTH = 5886 lb/ft

6 — 3.51 k — 50.00
LRFD SHEAR= 6926 lb 1154 lb/ft
ASD SHEAR= 4848 lb 808 lb/ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/16
ANCHORAGE: 3/8" x 5" A36 Plate
#12 Trk - Trk Max Screw Spacing 8 in
10.00 ft
DIAPHRAGM SHEAR (Q_E) = 1658 lb
TOTAL BAY SHEAR (Q_E) = 13852 lb
EXPECTED STRENGTH = 6330 lb/ft

LATERAL FORCE RESISTING SYSTEM

SW-2

5 LRFD SHEAR= 7579 lb 1263 lb/ft
2.77 k → 10.00 ASD SHEAR= 5306 lb 884 lb/ft
DIAPHRAGM SHEAR (Q_E) = 1307 lb
TOTAL BAY SHEAR (Q_E) = 15159 lb

#12 Trk - Trk Max Screw Spacing 8 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x1/4
ANCHORAGE: 1/2" x 5" A36 Plate
EXPECTED STRENGTH = 7392 lb/ft

4 LRFD SHEAR= 8060 lb 1343 lb/ft
2.04 k → 10.00 ASD SHEAR= 5642 lb 940 lb/ft
DIAPHRAGM SHEAR (Q_E) = 962 lb
TOTAL BAY SHEAR (Q_E) = 16120 lb

#12 Trk - Trk Max Screw Spacing 7 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x5/16
ANCHORAGE: 1/2" x 5" A572 Gr50 Plate
EXPECTED STRENGTH = 7392 lb/ft

3 LRFD SHEAR= 8372 lb 1395 lb/ft
1.32 k → 10.00 ASD SHEAR= 5861 lb 977 lb/ft
DIAPHRAGM SHEAR (Q_E) = 624 lb
TOTAL BAY SHEAR (Q_E) = 16745 lb

#12 Trk - Trk Max Screw Spacing 7 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x3/8
ANCHORAGE: 1/2" x 5" A572 Gr50 Plate
EXPECTED STRENGTH = 7392 lb/ft

2 LRFD SHEAR= 8521 lb 1420 lb/ft
0.63 k → ASD SHEAR= 5965 lb 994 lb/ft
DIAPHRAGM SHEAR (Q_E) = 298 lb
TOTAL BAY SHEAR (Q_E) = 17043 lb

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 7 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: HSS 6x6x1/2
ANCHORAGE: Weld Direct to Transfer PL
EXPECTED STRENGTH = 8415 lb/ft

1

ClarkDietrich ENGINEERING SERVICES		PROJECT NAME:	CFS-NHERI 10 Story Test Portion		
		PROJECT NUMBER:	2150200882		
		ENGINEER:	L. Padgett	DATE:	3/22/2022
2262 Rutherford Road, Suite 104	Phone: (877) 832-3206	CHECKER:	LAP	DATE:	
Carlsbad, California 92008	www.ClarkDietrich.com	SUBJECT:	ASD Seismic LFRS Loading		

LATERAL FORCE RESISTING SYSTEM

SW-2

DESIGN SPECTRAL RESPONSE ACCELLERATION, SHORT PEF S_{DS} = 1.0088
SYSTEM OVERSTRENGTH FACTOR (LONGITUDINAL DIRECTIC Ω_0 = 3.0
REDUNDANCY FACTOR (LONGITUDINAL DIRECTION) ρ = 1.0

INDIVIDUAL LOADS

		UNFACTORED ON-CENTER STUD LOADS			END-POST LOADS FROM HORIZONTAL LOADING		GOVERNING LOADS CONVERTED TO ASD: ASD END-POST AND HOLDOWN LOADS	
HEIGHT ft	LEVEL	P_{DL} lb	P_{DL} FOR UPLIFT lb	P_{LL} lb	Q_E lb	EXPECTED STRENGTH lb	ASD Post Compression lb (FS=1.8)	ASD HD Tension lb (FS=3)
10.00	10	739	739	520	1639 1639	19410 19410	3596	-1467
10.00	9	1515	1515	1255	4225 5864	30000 49410	11650	-5511
10.00	8	2291	2291	2510	6505 12370	35100 84510	23794	-11836
10.00	7	3067	3067	3765	8483 20853	51390 135900	39235	-20139
10.00	6	3843	3843	5020	10162 31014	58860 194760	57472	-30120
10.00	5	4619	4619	6275	11543 42558	63300 258060	78013	-41483
10.00	4	5395	5395	7530	12632 55190	73920 331980	100368	-53934
10.00	3	6171	6171	8785	13434 68624	73920 331980	124059	-67187
10.00	2	6947	6947	10040	13954 82578	73920 331980	148617	-80961
10.00	1	7723	7723	11295	14202 96780	84150 416130	173589	-94982
				Anchor LRFD Uplift=	-89829 lb		S100-12, Section C4.1 FS=1.8	FS=3.0

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Carlsbad, California 92008 www.ClarkDietrich.com

PROJECT NAME:	**CFS-NHERI 10 Story Test Portion**		
PROJECT NUMBER:	**2150200882**		
ENGINEER:	**L. Padgett**	DATE:	**3/22/2022**
CHECKER:	**LAP**	DATE:	
SUBJECT:	**ASD Seismic LFRS Loading**		

LATERAL FORCE RESISTING SYSTEM

SW-2

SEISMIC LOAD COMBINATION SUMMARY

		ASD END-POST LOADS FROM SEISMIC LOADING				NOMINAL END-POST LOADS FROM EXPECTED STRENGTH OR AMPLIFIED SEISMIC LOADING ($\Omega_0 Q_E$)			
HEIGHT ft	LEVEL	CASE 5 [a] COMPRESS. lb	CASE 6 [b] COMPRESS. lb	GOVERNING COMPRESS. lb	CASE 8 [c] TENSION lb	CASE 5 [d] COMPRESS. lb	CASE 7 [e] TENSION lb	NOMINAL [f] COMPRESS. lb	NOMINAL [f] TENSION lb
10.00	10	1886	1990	1990	-704	6473	-4402	6473	-4402
10.00	9	5620	5535	5620	-3196	20971	-16534	20971	-16534
10.00	8	10950	10668	10950	-7284	42830	-35509	42830	-35509
10.00	7	17664	16839	17664	-12757	70623	-60417	70623	-60417
10.00	6	25553	23891	25553	-19404	103450	-90360	103450	-90360
10.00	5	34409	31668	34409	-27019	140423	-124448	140423	-124448
10.00	4	44028	40017	44028	-35396	180662	-161803	180662	-161803
10.00	3	54208	48787	54208	-44334	223306	-201562	223306	-201562
10.00	2	64751	57830	64751	-53636	267511	-242882	267511	-242882
10.00	1	75469	67004	75469	-63112	312460	-284947	312460	-284947
					ASD			NOMINAL	

[a] FROM CASE 5, SECTION 2.4.1: $D + 0.7\ Q_E$
[b] FROM CASE 6, SECTION 2.4.1: $D + 0.75\ (0.7\ Q_E) + 0.75\ L$
[c] FROM CASE 8, SECTION 2.4.1: $0.6\ D - 0.7\ Q_E$
[d] FROM CASE 5, SECTION 12.4.3.2: $(1.2 + 0.2\ S_{DS})\ D + \Omega_0\ Q_E + L + 0.2S$
[e] FROM CASE 7, SECTION 12.4.3.2: (0.9 - 0.2 SDS) D - Ω0 Q_E +1.6H
[f] REQUIRED NOMINAL STRENGTH = LESSER OF EXPECTED STRENGTH OR OVERSTRENGTH AMPLIFIED SEISMIC

BASED ON AISI S400-15 SECTIONS E2.4.1.2, END-POSTS, HOLDOWNS, AND CONNECTIONS THAT ARE NOT PART OF THE ENERGY DISSIPATI SYSTEM (SHEATHING AND FASTENERS) MUST HAVE THE <u>NOMINAL</u> STRENGTH TO RESIST THE LESSER OF THE EXPECTED STRENGTH OR THE AMPLIFIED SEISMIC LOAD EFFECTS INCLUDING OVERSTRENGTH.

Q_E IS THE UNFACTORED COMPONENT FORCE RESULTING FROM A HORIZONTAL SEISMIC LOAD

SHEATHING IS EVALUATED BASED ON 0.7 Q_E COMPARED TO THE ALLOWABLE SHEATHING CAPACITY (NOMINAL SHEATHING CAPACITY DIVIDED BY Ω FACTOR OF SAFETY).

Sheathing Selection (See Reference Page)

ASD SHEAR DEMAND	NOMINAL DEMAND	NOMINAL CAPACITY	MAXIMUM ASPECT RATIO	ALLOWABLE ASPECT RATIO	ITEM #
115 lb/ft	287 lb/ft	647 lb/ft	1.667	2.000	18
296 lb/ft	739 lb/ft	1000 lb/ft	1.667	2.000	33
455 lb/ft	1138 lb/ft	1170 lb/ft	1.667	2.000	31
594 lb/ft	1485 lb/ft	1713 lb/ft	1.667	2.000	29
711 lb/ft	1778 lb/ft	1962 lb/ft	1.667	2.000	28
808 lb/ft	2020 lb/ft	2110 lb/ft	1.667	2.000	27
884 lb/ft	2211 lb/ft	2464 lb/ft	1.667	2.000	26
940 lb/ft	2351 lb/ft	2464 lb/ft	1.667	2.000	26
977 lb/ft	2442 lb/ft	2464 lb/ft	1.667	2.000	26
994 lb/ft	2485 lb/ft	2805 lb/ft	1.667	2.000	25

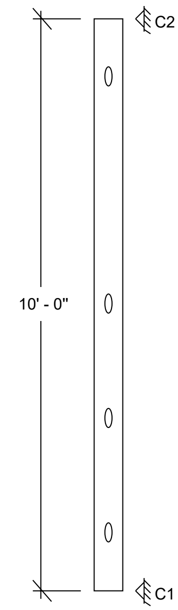
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	SW-2 End Post: Level 10 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 1:38 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-1)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-3896.00 lbs	NA	NA

Specified Member

(1) 600S250-43 33 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	1500 lb-in	18140 lb-in	8.27%	5.00 ft	Custom	Pass
Moment: Stability	1500 lb-in	18140 lb-in	8.27%	5.00 ft	Custom	Pass
Moment: Dist. Buckling	1500 lb-in	16211 lb-in	9.25%	5.00 ft	Custom	Pass
Shear	50 lbs	1240 lbs	4.03%	0.00 ft	Custom	Pass
V/M Interaction	0.08	1	8.27%	5.00 ft	Custom	Pass
Axial Stability	-3896 lbs	4724 lbs	82.47%	0.00 ft	DL	Pass
P/M Interaction	0.93	1	92.89%	5.00 ft	Custom	Pass
Moment of Inertia	0.153 in^4	3.083 in^4	4.95%	5.00 ft	Custom	Pass
Span Deflection	0.025 in	0.5 in	L/4850	5.00 ft	Custom	Pass
Web Crippling	50 lbs	410 lbs	12.19%	C2	Custom	Pass
Web Crippling	50 lbs	410 lbs	12.19%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 50 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

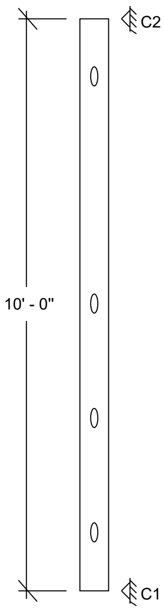
C1:	Wind:	Rx = 50 lbs			Ry = 3896 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	SW-2 End Post: Level 09 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 1:40 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max (FB43-2)	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-11859.00 lbs	NA	NA

Specified Member

(1) 600HDS300-54 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	1500 lb-in	43347 lb-in	3.46%	5.00 ft	Custom	Pass
Moment: Stability	1500 lb-in	43347 lb-in	3.46%	5.00 ft	Custom	Pass
Moment: Dist. Buckling	1500 lb-in	35155 lb-in	4.27%	5.00 ft	Custom	Pass
Shear	50 lbs	1947 lbs	2.57%	0.00 ft	Custom	Pass
V/M Interaction	0.03	1	3.46%	5.00 ft	Custom	Pass
Axial Stability	-11859 lbs	14748 lbs	80.41%	0.00 ft	DL	Pass
P/M Interaction	0.86	1	85.86%	5.00 ft	Custom	Pass
Moment of Inertia	0.153 in^4	4.75 in^4	3.21%	5.00 ft	Custom	Pass
Span Deflection	0.016 in	0.5 in	L/7474	5.00 ft	Custom	Pass
Web Crippling	50 lbs	930 lbs	5.37%	C2	Custom	Pass
Web Crippling	50 lbs	930 lbs	5.37%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 50 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

C1:	Wind:	Rx = 50 lbs			Ry = 11859 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

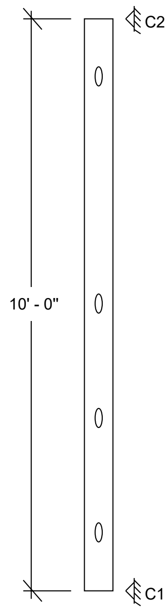
DesignPro
Wall Designer Output Version 6.0.2.0

ClarkDietrich ENGINEERING SERVICES

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	SW-2 End Post: Level 08 - Test	Phone Number:	678.304.5525
Date/Time:	10/28/2021 / 1:42 PM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-23594.00 lbs	NA	NA

Specified Member

(1) 600HDS300-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	1500 lb-in	91817 lb-in	1.63%	5.00 ft	Custom	Pass
Moment: Stability	1500 lb-in	83195 lb-in	1.80%	5.00 ft	Custom	Pass
Moment: Dist. Buckling	1500 lb-in	75993 lb-in	1.97%	5.00 ft	Custom	Pass
Shear	50 lbs	3805 lbs	1.31%	0.00 ft	Custom	Pass
V/M Interaction	0.02	1	1.63%	5.00 ft	Custom	Pass
Axial Stability	-23594 lbs	30290 lbs	77.89%	0.00 ft	DL	Pass
P/M Interaction	0.81	1	80.53%	5.00 ft	Custom	Pass
Moment of Inertia	0.153 in^4	8.336 in^4	1.83%	5.00 ft	Custom	Pass
Span Deflection	0.009 in	0.5 in	L/13115	5.00 ft	Custom	Pass
Web Crippling	50 lbs	2197 lbs	2.28%	C2	Custom	Pass
Web Crippling	50 lbs	2197 lbs	2.28%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 50 lbs			Ry = 0 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 7% Capacity

C1:	Wind:	Rx = 50 lbs			Ry = 23594 lbs

600T125-54 50 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 7% Capacity

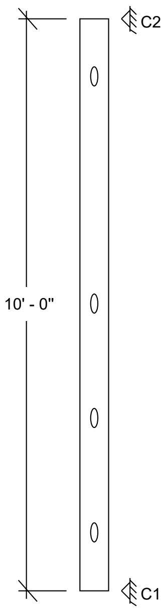
DesignPro
Wall Designer Output

Version 6.0.3.5

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	SW-2 End Post: Level 07 - Test	Phone Number:	678.304.5525
Date/Time:	3/23/2022 / 8:28 AM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:

Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-38889.00 lbs	NA	NA

Specified Member

(2) 600HDS300-68 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	1500 lb-in	115356 lb-in	1.30%	5.00 ft	Custom	Pass
Moment: Stability	1500 lb-in	115356 lb-in	1.30%	5.00 ft	Custom	Pass
Moment: Dist. Buckling	1500 lb-in	95868 lb-in	1.56%	5.00 ft	Custom	Pass
Shear	50 lbs	5758 lbs	0.87%	0.00 ft	Custom	Pass
V/M Interaction	0.01	1	1.30%	5.00 ft	Custom	Pass
Axial Stability	-38889 lbs	40917 lbs	95.04%	0.00 ft	DL	Pass
P/M Interaction	0.97	1	97.24%	5.00 ft	Custom	Pass
Moment of Inertia	0.153 in^4	12.051 in^4	1.27%	5.00 ft	Custom	Pass
Span Deflection	0.006 in	0.5 in	L/18960	5.00 ft	Custom	Pass
Stud-to-Track	50 lbs	2094 lbs	2.39%	C2	Custom	Pass
Stud-to-Track	50 lbs	2094 lbs	2.39%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 50 lbs			Ry = 0 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

C1:	Wind:	Rx = 50 lbs			Ry = 38889 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

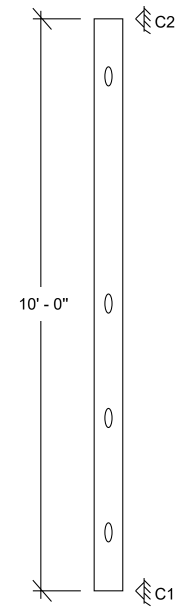
DesignPro
Wall Designer Output

Version 6.0.3.5

Project Name:	CFS-NHERI 10 Story Archetype	Company:	ClarkDietrich Engineering Services LLC
Project Number:	2150200882-0	Contact Name:	Lynn Padgett, P.E.
Wall:	SW-2 End Post: Level 06 - Test	Phone Number:	678.304.5525
Date/Time:	3/23/2022 / 8:30 AM		

Inputs

Building Code:	CBC 2016	Deflection Limit:	L/240
Design Option:	Custom	0.7 Deflection Used:	No
Member Spacing:	24 in		
Bracing Distance:	4' O.C. Max	Dead Load:	0 psf
Knockout:	Punched	z:	100 ft



Wind Pressures

Custom Pressures:
Span Pressure: 5.00 psf

Point and Distributed Loads

Load Type	Load Case	Direction	Loc.(Start)	Load(Start)	Loc.(End)	Load(End)
Axial Point	Pressure	Global FY	10.00 ft	-57007.00 lbs	NA	NA

Specified Member

(2) 600HDS300-97 50 ksi @ 24" O.C.

Stud Design Results

Interaction Check	Actual	Allowable	Capacity	Location	Controlled By	Pass/Fail
Moment: Strength	1500 lb-in	183633 lb-in	0.82%	5.00 ft	Custom	Pass
Moment: Stability	1500 lb-in	166389 lb-in	0.90%	5.00 ft	Custom	Pass
Moment: Dist. Buckling	1500 lb-in	151987 lb-in	0.99%	5.00 ft	Custom	Pass
Shear	50 lbs	7611 lbs	0.66%	0.00 ft	Custom	Pass
V/M Interaction	0.01	1	0.82%	5.00 ft	Custom	Pass
Axial Stability	-57007 lbs	60580 lbs	94.10%	0.00 ft	DL	Pass
P/M Interaction	0.96	1	95.52%	5.00 ft	Custom	Pass
Moment of Inertia	0.153 in^4	16.672 in^4	0.91%	5.00 ft	Custom	Pass
Span Deflection	0.005 in	0.5 in	L/26231	5.00 ft	Custom	Pass
Stud-to-Track	50 lbs	2094 lbs	2.39%	C2	Custom	Pass
Stud-to-Track	50 lbs	2094 lbs	2.39%	C1	Custom	Pass

Specified Connections

C2:	Wind:	Rx = 50 lbs			Ry = 0 lbs

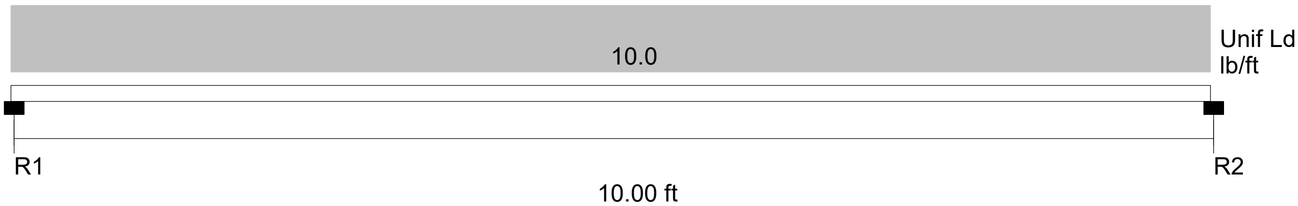
600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

C1:	Wind:	Rx = 50 lbs			Ry = 57007 lbs

600T125-43 33 ksi Track w/ (1) Buildex #10-16 T3 to 54-50 L.S.F. at 16" O.C. - 13% Capacity

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 6 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X3/16 **Fy =** 46.0 ksi
Sxx = 7.42 in^3 **Zxx =** 8.63 in^3 **Moment of Inertia, I =** 22.3 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Flexural and Deflection Check

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Non Compact	Compact	397.0	NA	221.8	0.003	L/35085

Support Reactions

Reaction	Load (lb)
R1	50
R2	50

Allowable Shear

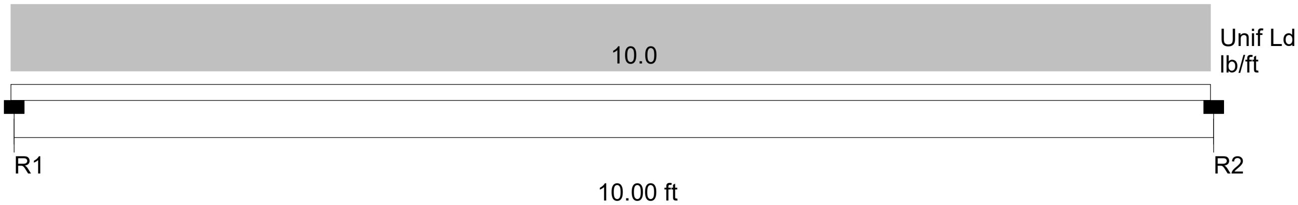
Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	31.48	56.14	1.000	31506.1	0.00
R2	50.0	31.48	56.14	1.000	31506.1	0.00

Combined Bending and Axial Load

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	57472.0 (c)	None	51	No	NA	1.262	92263	0.63

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 5 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X3/16 **Fy =** 46.0 ksi
Sxx = 7.42 in^3 **Zxx =** 8.63 in^3 **Moment of Inertia, I =** 22.3 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Flexural and Deflection Check

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Non Compact	Compact	397.0	NA	221.8	0.003	L/35085

Support Reactions

Reaction	Load (lb)
R1	50
R2	50

Allowable Shear

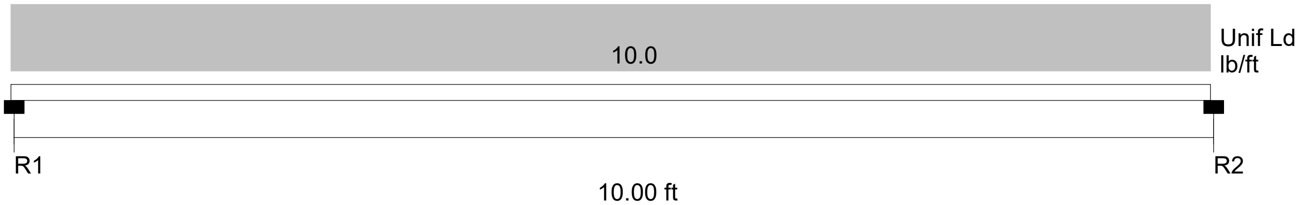
Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	31.48	56.14	1.000	31506.1	0.00
R2	50.0	31.48	56.14	1.000	31506.1	0.00

Combined Bending and Axial Load

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	78013.0 (c)	None	51	No	NA	1.392	92263	0.85

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 4 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X1/4 **Fy =** 46.0 ksi
Sxx = 9.54 in^3 **Zxx =** 11.20 in^3 **Moment of Inertia, I =** 28.6 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

<u>Flexural and Deflection Check</u>

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Compact	Compact	515.2	NA	308.5	0.003	L/44997

<u>Support Reactions</u>

Reaction	Load (lb)
R1	50
R2	50

<u>Allowable Shear</u>

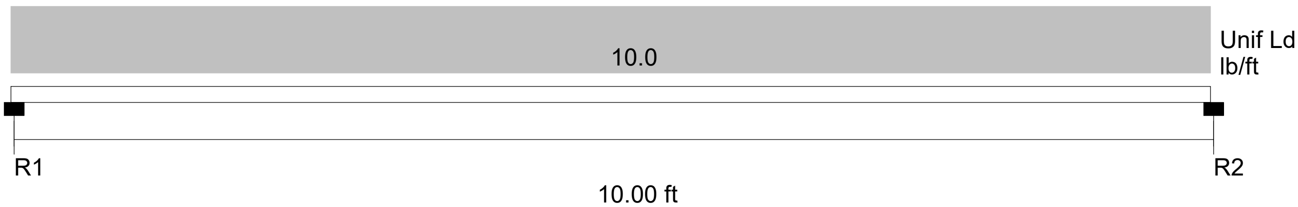
Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	22.75	56.14	1.000	40826.0	0.00
R2	50.0	22.75	56.14	1.000	40826.0	0.00

<u>Combined Bending and Axial Load</u>

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	100368.0 (c)	None	51	No	NA	1.394	120933	0.84

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 3 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X5/16 **Fy =** 46.0 ksi
Sxx = 11.40 in^3 **Zxx =** 13.60 in^3 **Moment of Inertia, I =** 34.3 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Flexural and Deflection Check

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Compact	Compact	625.6	NA	374.6	0.002	L/53965

Support Reactions

Reaction	Load (lb)
R1	50
R2	50

Allowable Shear

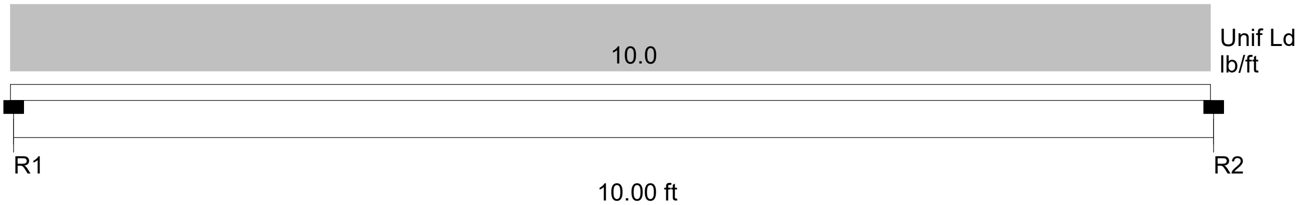
Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	17.62	56.14	1.000	49315.0	0.00
R2	50.0	17.62	56.14	1.000	49315.0	0.00

Combined Bending and Axial Load

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	124059.0 (c)	None	52	No	NA	1.411	147712	0.84

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 2 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X3/8 **Fy =** 46.0 ksi
Sxx = 13.20 in^3 **Zxx =** 15.80 in^3 **Moment of Inertia, I =** 39.5 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Flexural and Deflection Check

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Compact	Compact	726.8	NA	435.2	0.002	L/62146

Support Reactions

Reaction	Load (lb)
R1	50
R2	50

Allowable Shear

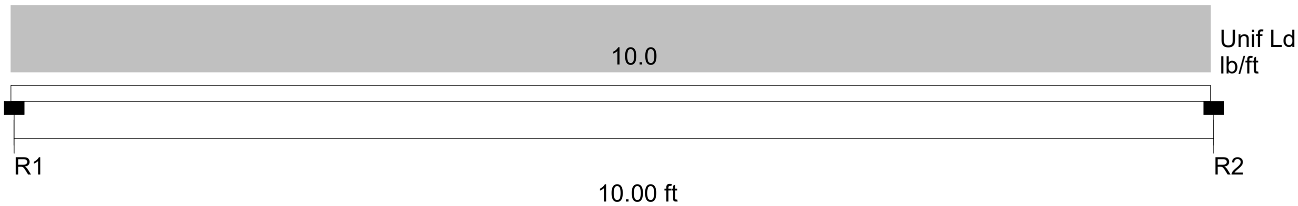
Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	14.19	56.14	1.000	57136.9	0.00
R2	50.0	14.19	56.14	1.000	57136.9	0.00

Combined Bending and Axial Load

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	148617.0 (c)	None	53	No	NA	1.434	173295	0.86

AISC 13th Edition, ASD

Project: SW-2 End Post: Level 1 Test **Date:** 3/23/2022
Model: 5psf*24/12 = 10plf



Section : HSS6X6X1/2 **Fy =** 46.0 ksi
Sxx = 16.10 in^3 **Zxx =** 19.80 in^3 **Moment of Inertia, I =** 48.3 in^4

Loads have not been modified for strength checks
Loads have not been modified for deflection calculations

Flexural and Deflection Check

Span	Mmax in-k	Flanges	Webs	Mp in-k	Seff in^3	Ma in-k	Deflection (in)	Deflection Ratio
Center Span	1.5	Compact	Compact	910.8	NA	545.4	0.002	L/75991

Support Reactions

Reaction	Load (lb)
R1	50
R2	50

Allowable Shear

Reaction or Pt Load	Vmax (lb)	h/tw	(Kv*E/Fy)^0.5	Cv	Va (lb)	Vmax/Va
R1	50.0	9.90	56.14	1.000	70779.1	0.00
R2	50.0	9.90	56.14	1.000	70779.1	0.00

Combined Bending and Axial Load

Span	Axial Ld (lb)	Bracing (in) KyLy	Max KL/r	Slender?	Qa	B1	Pn/Omega Pc (lb)	Intr. Value
Center Span	173589.0 (c)	None	54	No	NA	1.407	220803	0.79

Project Number:

Project Name:

Eng. Name:

Subject:

Date:

TO BE APPROVED BY OWNER'S ARCHITECT AND ENGINEER

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Project Number: ______________________

Project Name: ______________________

Eng. Name: ______________________

Subject: ______________________

Date: ______________________

TO BE APPROVED BY OWNER'S ARCHITECT AND ENGINEER

Project Number: ______________________

Project Name: ______________________

Eng. Name: ______________________

Subject: ______________________

Date: ______________________

TO BE APPROVED BY OWNER'S ARCHITECT AND ENGINEER

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

NOTES

- S240-15 Section B5.2, Blocked Sheet Steel Capacity from Recent Roger's Study.
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Governing location GL 2. Endpost compression and tension based on 2ft oc W5 studs.
- Longitude wind approximately equivalent to the seismic is 75 mph Exposure C, 8 windward psf + 2.4 leeward psf.

LATERAL FORCE RESISTING SYSTEM **SW-2**

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL **LONGITUDINAL DIRECTION**

ASD WIND LOAD ANALYSIS

BUILDING BAY SIZE: 11.25 ft
SAFETY FACTOR: 2.0 S240-15 B5.2.3

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

3.75 ft

8.0 psf **R** LRFD SHEAR= 2.4 psf
100.00 ASD SHEAR= 512 lb 85 lb/ft
DIAPHRAGM SHEAR = 1024 lb
TOTAL SHEAR = 1024 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 410 lb
POST COMPRESSION LOAD = 2145 lb

8.0 psf **10** LRFD SHEAR= 2.4 psf
90.00 ASD SHEAR= 1097 lb 183 lb/ft
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 2194 lb

#12 Trk - Trk Max Screw Spacing 18 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 1772 lb
POST COMPRESSION LOAD = 5286 lb

8.0 psf **9** LRFD SHEAR= 2.4 psf
80.00 ASD SHEAR= 1682 lb 280 lb/ft
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 3364 lb

#12 Trk - Trk Max Screw Spacing 12 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST:
ANCHORAGE:
POST TENSION LOAD = 4110 lb
POST COMPRESSION LOAD = 9679 lb

8.0 psf **8** LRFD SHEAR= 2.4 psf
70.00 ASD SHEAR= 2267 lb 378 lb/ft
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 4534 lb

#12 Trk - Trk Max Screw Spacing 18 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 7422 lb
POST COMPRESSION LOAD = 14801 lb

8.0 psf **7** LRFD SHEAR= 2.4 psf
60.00 ASD SHEAR= 2852 lb 475 lb/ft
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 5704 lb

#12 Trk - Trk Max Screw Spacing 14 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 11710 lb
POST COMPRESSION LOAD = 20655 lb

8.0 psf **6** LRFD SHEAR= 2.4 psf
50.00 ASD SHEAR= 3437 lb 573 lb/ft
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 6874 lb

#12 Trk - Trk Max Screw Spacing 12 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 16972 lb
POST COMPRESSION LOAD = 27242 lb

LATERAL FORCE RESISTING SYSTEM SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

LONGITUDINAL DIRECTION

5
8.0 psf → 40.00 LRFD SHEAR=
ASD SHEAR= 4022 lb 670 lb/ft → 2.4 psf
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 8044 lb

#12 Trk - Trk Max Screw Spacing 10 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 23210 lb
POST COMPRESSION LOAD = 34558 lb

4
8.0 psf → 30.00 LRFD SHEAR=
ASD SHEAR= 4607 lb 768 lb/ft → 2.4 psf
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 9214 lb

#12 Trk - Trk Max Screw Spacing 9 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 30422 lb
POST COMPRESSION LOAD = 42607 lb

3
8.0 psf → 20.00 LRFD SHEAR=
ASD SHEAR= 5192 lb 865 lb/ft → 2.4 psf
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 10384 lb

#12 Trk - Trk Max Screw Spacing 8 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 38610 lb
POST COMPRESSION LOAD = 52041 lb

2
8.0 psf → 10.00 LRFD SHEAR=
ASD SHEAR= 5777 lb 963 lb/ft → 2.4 psf
DIAPHRAGM SHEAR = 1170 lb
TOTAL SHEAR = 11554 lb

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 7 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST:
ANCHORAGE:
POST TENSION LOAD = 47772 lb
POST COMPRESSION LOAD = 62703 lb

1

LATERAL FORCE RESISTING SYSTEM

SW-2

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL **LONGITUDINAL DIRECTION**

HEIGHT	LEVEL	UNFACTORED GRAVITY LOADS AT BRACED WALL END-POST			END-POST LOAD (FROM WIND ONLY)	ASD LEVEL TENSION & COMPRESSION LOADS AT BRACED WALL END-POST			
		P_{DL}	P_{DL} FOR UPLIFT	P_{LL}		CASE 5 [a] COMPRESS.	CASE 6 [b] COMPRESS.	GOVERNING COMPRESS.	CASE 8 [c] TENSION
ft		lb	lb	lb	lb	lb	lb	lb	lb
10.00	10	985	739	693	853 853	1838	2145	2145	-410
10.00	9	2020	1515	1673	1828 2681	4701	5286	5286	-1772
10.00	8	3055	2291	3347	2803 5484	8539	9679	9679	-4110
10.00	7	4089	3067	5020	3778 9263	13352	14801	14801	-7422
10.00	6	5121	3843	6697	4753 14016	19137	20655	20655	-11710
10.00	5	6159	4619	8367	5728 19744	25903	27242	27242	-16972
10.00	4	7193	5395	10040	6703 26447	33640	34558	34558	-23210
10.00	3	8228	6171	11713	7678 34125	42353	42607	42607	-30422
10.00	2	9263	6947	13387	8653 42778	52041	51387	52041	-38610
10.00	1	10297	7723	15060	9628 52406	62703	60897	62703	-47772

Anchor LRFD Uplift = -80393 lb

ALL LOADS ARE EVALUATED BASED ON THE ALLOWABLE STRESS REQUIREMENTS OF ASCE 7.

[a] FROM CASE 5, SECTION 2.4.1: D + Wasd
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 Wasd + 0.75 L
[c] FROM CASE 7, SECTION 2.4.1: 0.6 D - Wasd

LATERAL FORCE RESISTING SYSTEM

SW-3

ASD SEISMIC LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

NOTES

- R>3, AISI S400-15 Sheathed Shearwal. Blocked Sheet Steel Capacity from Recent Roger's Study.
- 33Ksi Sheet Steel, Fy must be less than 50 Ksi
- No Gypsum Sheathing (R=2)
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- GL C & E, Interior W3 Demising Wall, 270sf / 855sf . Endpost compression per 3ft opening, tension per W3 stud. - No Wind Design, compare to Archetype 913plf base shear

SHEAR WALL SUMMARY

HEIGHT ft	LEVEL	SHEATHING TYPE	FASTENER SPACING	MINIMUM STUD GAUGE	POST TYPE	BOTTOM ANCHORAGE	OPTIONAL SHEATHING
10.00	10	27 MIL STEEL (33Ksi)	6 / 12	18	Tension Rod System	Tension Rod System	
10.00	9	27 MIL STEEL (33Ksi)	6 / 12	18	Tension Rod System	Tension Rod System	
10.00	8	27 MIL STEEL (33Ksi)	4 / 12	18	Tension Rod System	Tension Rod System	
10.00	7	27 MIL STEEL (33Ksi)	4 / 12	18	Tension Rod System	Tension Rod System	
10.00	6	27 MIL STEEL (33Ksi)	2 / 12	18	Tension Rod System	Tension Rod System	
10.00	5	33 MIL STEEL (Blkg, #10) (33Ksi)	6 / 12	16	Tension Rod System	Tension Rod System	
10.00	4	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	
10.00	3	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	
10.00	2	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	
10.00	1	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	16	Tension Rod System	Tension Rod System	

LATERAL FORCE RESISTING SYSTEM

SW-3

SEISMIC LOAD ANALYSIS

BUILDING BAY AREA: 248 sf
TOTAL BUILDING AREA: 810 sf
SAFETY FACTOR: 2.5 S400-15 E2.3.2

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

Level	Force	Elev.	LRFD SHEAR	LRFD (lb/ft)	ASD SHEAR	ASD (lb/ft)	Story Height	#12 Trk - Trk Max Screw Spacing	SHEATHING	END POST	ANCHORAGE	DIAPHRAGM SHEAR (Q_E)	TOTAL BAY SHEAR (Q_E)	EXPECTED STRENGTH
R	4.17 k	100.00	636 lb	106 lb/ft	445 lb	74 lb/ft	10.00 ft	24 in	27 MIL STEEL (33Ksi)	Tension Rod System	Tension Rod System	1273 lb	1273 lb	1941 lb/ft
10	6.57 k	90.00	1640 lb	273 lb/ft	1148 lb	191 lb/ft	10.00 ft	17 in	27 MIL STEEL (33Ksi)	Tension Rod System	Tension Rod System	2008 lb	3281 lb	1941 lb/ft
9	5.80 k	80.00	2526 lb	421 lb/ft	1768 lb	295 lb/ft	10.00 ft	11 in	27 MIL STEEL (33Ksi)	Tension Rod System	Tension Rod System	1771 lb	5051 lb	3000 lb/ft
8	5.03 k	70.00	3294 lb	549 lb/ft	2305 lb	384 lb/ft	10.00 ft	9 in	27 MIL STEEL (33Ksi)	Tension Rod System	Tension Rod System	1536 lb	6587 lb	3000 lb/ft
7	4.26 k	60.00	3945 lb	658 lb/ft	2762 lb	460 lb/ft	10.00 ft	15 in	27 MIL STEEL (33Ksi)	Tension Rod System	Tension Rod System	1303 lb	7890 lb	3510 lb/ft
6	3.51 k	50.00	4481 lb	747 lb/ft	3137 lb	523 lb/ft	10.00 ft	13 in	33 MIL STEEL (Blkg, #10) (	Tension Rod System	Tension Rod System	1073 lb	8963 lb	4095 lb/ft

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PROJECT NAME:	**CFS-NHERI 10 Story Test Portion**		
PROJECT NUMBER:	**2150200882**		
ENGINEER:	**L. Padgett**	DATE:	**3/22/2022**
CHECKER:	**LAP**	DATE:	
SUBJECT:	**ASD Seismic LFRS Loading**		

LATERAL FORCE RESISTING SYSTEM

SW-3

5
2.77 k →
LRFD SHEAR= 4904 lb 817 lb/ft
10.00 ASD SHEAR= 3433 lb 572 lb/ft

#12 Trk - Trk Max Screw Spacing 12 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 846 lb
TOTAL BAY SHEAR (Q_E) = 9809 lb
EXPECTED STRENGTH = 5139 lb/ft

4
2.04 k →
LRFD SHEAR= 5215 lb 869 lb/ft
10.00 ASD SHEAR= 3651 lb 608 lb/ft

#12 Trk - Trk Max Screw Spacing 11 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 622 lb
TOTAL BAY SHEAR (Q_E) = 10431 lb
EXPECTED STRENGTH = 5139 lb/ft

3
1.32 k →
LRFD SHEAR= 5417 lb 903 lb/ft
10.00 ASD SHEAR= 3792 lb 632 lb/ft

#12 Trk - Trk Max Screw Spacing 11 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 404 lb
TOTAL BAY SHEAR (Q_E) = 10835 lb
EXPECTED STRENGTH = 5139 lb/ft

2
0.63 k →
LRFD SHEAR= 5514 lb 919 lb/ft
ASD SHEAR= 3860 lb 643 lb/ft

3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 11 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: Tension Rod System
ANCHORAGE: Tension Rod System

DIAPHRAGM SHEAR (Q_E) = 193 lb
TOTAL BAY SHEAR (Q_E) = 11028 lb
EXPECTED STRENGTH = 5139 lb/ft

1

ClarkDietrich ENGINEERING SERVICES		PROJECT NAME:	**CFS-NHERI 10 Story Test Portion**
		PROJECT NUMBER:	**2150200882**
		ENGINEER:	**L. Padgett** DATE: **3/22/2022**
2262 Rutherford Road, Suite 104	**Phone: (877) 832-3206**	CHECKER:	**LAP** DATE:
Carlsbad, California 92008	**www.ClarkDietrich.com**	SUBJECT:	**ASD Seismic LFRS Loading**

LATERAL FORCE RESISTING SYSTEM

SW-3

DESIGN SPECTRAL RESPONSE ACCELLERATION, SHORT PEF S_{DS} = 1.0088
SYSTEM OVERSTRENGTH FACTOR (TRANSVERSE DIRECTION Ω_0 = 3.0
REDUNDANCY FACTOR (TRANSVERSE DIRECTION) ρ = 1.0

INDIVIDUAL LOADS

GOVERNING LOADS CONVERTED TO ASD

		UNFACTORED ON-CENTER STUD LOADS			END-POST LOADS FROM HORIZONTAL LOADING		ASD END-POST AND HOLDOWN LOADS	
HEIGHT ft	LEVEL	P_{DL} lb	P_{DL} FOR UPLIFT lb	P_{LL} lb	Q_E lb	EXPECTED STRENGTH lb	ASD Post Compression lb (FS=1.8)	ASD HD Tension lb (FS=3)
10.00	10	238	179	71	1061 1061	19410 19410	1993	-1005
10.00	9	620	465	177	2734 3794	19410 38820	6905	-3650
10.00	8	1001	751	355	4209 8004	30000 68820	14316	-7771
10.00	7	1382	1036	532	5489 13493	30000 98820	23860	-13171
10.00	6	1763	1322	709	6575 20068	35100 133920	35214	-19658
10.00	5	2144	1608	887	7469 27537	40950 174870	48058	-27038
10.00	4	2525	1894	1064	8174 35711	51390 226260	62076	-35123
10.00	3	2906	2180	1241	8692 44404	51390 226260	76958	-43727
10.00	2	3288	2466	1419	9029 53433	51390 226260	92403	-52667
10.00	1	3669	2752	1596	9190 62622	51390 277650	108114	-61768
				Anchor LRFD Uplift=	-60145 lb		S100-12, Section C4.1 FS=1.8	FS=3.0

LATERAL FORCE RESISTING SYSTEM

SW-3

SEISMIC LOAD COMBINATION SUMMARY

		ASD END-POST LOADS FROM SEISMIC LOADING				NOMINAL END-POST LOADS FROM EXPECTED STRENGTH OR AMPLIFIED SEISMIC LOADING (Ω_0 Q_E)			
HEIGHT ft	LEVEL	CASE 5 [a] COMPRESS. lb	CASE 6 [b] COMPRESS. lb	GOVERNING COMPRESS. lb	CASE 8 [c] TENSION lb	CASE 5 [d] COMPRESS. lb	CASE 7 [e] TENSION lb	NOMINAL [f] COMPRESS. lb	NOMINAL [f] TENSION lb
10.00	10	980	848	980	-635	3587	-3016	3587	-3016
10.00	9	3276	2745	3276	-2377	12429	-10950	12429	-10950
10.00	8	6604	5469	6604	-5152	25770	-23313	25770	-23313
10.00	7	10827	8865	10827	-8824	42948	-39514	42948	-39514
10.00	6	15811	12831	15811	-13255	63385	-58974	63385	-58974
10.00	5	21420	17266	21420	-18311	86504	-81115	86504	-81115
10.00	4	27523	22071	27523	-23861	111737	-105370	111737	-105370
10.00	3	33989	27149	33989	-29775	138525	-131182	138525	-131182
10.00	2	40691	32404	40691	-35923	166326	-158002	166326	-158002
10.00	1	47505	37743	47505	-42184	194606	-185305	194606	-185305
					ASD			NOMINAL	

[a] FROM CASE 5, SECTION 2.4.1: D + 0.7 Q_E
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 (0.7 Q_E) + 0.75 L
[c] FROM CASE 8, SECTION 2.4.1: 0.6 D - 0.7 Q_E
[d] FROM CASE 5, SECTION 12.4.3.2: (1.2 + 0.2 S_{DS}) D + Ω_0 Q_E + L + 0.2S
[e] FROM CASE 7, SECTION 12.4.3.2: (0.9 - 0.2 SDS) D - Ω0 Q_E +1.6H
[f] REQUIRED NOMINAL STRENGTH = LESSER OF EXPECTED STRENGTH OR OVERSTRENGTH AMPLIFIED SEISMIC

BASED ON AISI S400-15 SECTIONS E2.4.1.2, END-POSTS, HOLDOWNS, AND CONNECTIONS THAT ARE NOT PART OF THE ENERGY DISSIPATI SYSTEM (SHEATHING AND FASTENERS) MUST HAVE THE NOMINAL STRENGTH TO RESIST THE LESSER OF THE EXPECTED STRENGTH OR THE AMPLIFIED SEISMIC LOAD EFFECTS INCLUDING OVERSTRENGTH.

Q_E IS THE UNFACTORED COMPONENT FORCE RESULTING FROM A HORIZONTAL SEISMIC LOAD

SHEATHING IS EVALUATED BASED ON 0.7 Q_E COMPARED TO THE ALLOWABLE SHEATHING CAPACITY (NOMINAL SHEATHING CAPACITY DIVIDED BY Ω FACTOR OF SAFETY).

Sheathing Selection (See Reference Page)

ASD SHEAR DEMAND	NOMINAL DEMAND	NOMINAL CAPACITY	MAXIMUM ASPECT RATIO	ALLOWABLE ASPECT RATIO	ITEM #
74 lb/ft	186 lb/ft	647 lb/ft	1.667	2.000	18
191 lb/ft	478 lb/ft	647 lb/ft	1.667	2.000	18
295 lb/ft	737 lb/ft	1000 lb/ft	1.667	2.000	33
384 lb/ft	961 lb/ft	1000 lb/ft	1.667	2.000	33
460 lb/ft	1151 lb/ft	1170 lb/ft	1.667	2.000	31
523 lb/ft	1307 lb/ft	1365 lb/ft	1.667	2.000	30
572 lb/ft	1430 lb/ft	1713 lb/ft	1.667	2.000	29
608 lb/ft	1521 lb/ft	1713 lb/ft	1.667	2.000	29
632 lb/ft	1580 lb/ft	1713 lb/ft	1.667	2.000	29
643 lb/ft	1608 lb/ft	1713 lb/ft	1.667	2.000	29

LATERAL FORCE RESISTING SYSTEM

SW-3

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

NOTES

- S240-15 Section B5.2, Blocked Sheet Steel Capacity from Recent Roger's Study.
- Max aspect ratio = 2:1, but then 2w/h reduction up to 4:1
- Governing locations GL C & E, W3 Demising Wall, 11' Trib Width
- Transverse wind approximately equivalent to the SW-1 and SW-3 Demising seismic is 65 mph Exp C = 6 windward psf + 1.7 leeward psf.

LATERAL FORCE RESISTING SYSTEM

SW-3

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

ASD WIND LOAD ANALYSIS

BUILDING BAY SIZE: 11 ft
SAFETY FACTOR: 2.0 S240-15 B5.2.3

SHEAR WALL LENGTH: 6 ft
QUANTITY PER BAY: 2

3.75 ft

6.0 psf → **R** 100.00 LRFD SHEAR= ASD SHEAR= 371 lb 62 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 741 lb
TOTAL SHEAR = 741 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 510 lb
POST COMPRESSION LOAD = 797 lb

6.0 psf → **10** 90.00 LRFD SHEAR= ASD SHEAR= 794 lb 132 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 1588 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 1662 lb
POST COMPRESSION LOAD = 2406 lb

6.0 psf → **9** 80.00 LRFD SHEAR= ASD SHEAR= 1218 lb 203 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 2435 lb

#12 Trk - Trk Max Screw Spacing 16 in
10.00 ft
SHEATHING: 27 MIL STEEL (33Ksi)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 3520 lb
POST COMPRESSION LOAD = 4721 lb

6.0 psf → **8** 70.00 LRFD SHEAR= ASD SHEAR= 1641 lb 274 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 3282 lb

#12 Trk - Trk Max Screw Spacing 24 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 6084 lb
POST COMPRESSION LOAD = 7741 lb

6.0 psf → **7** 60.00 LRFD SHEAR= ASD SHEAR= 2065 lb 344 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 4129 lb

#12 Trk - Trk Max Screw Spacing 20 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 9353 lb
POST COMPRESSION LOAD = 11468 lb

6.0 psf → **6** 50.00 LRFD SHEAR= ASD SHEAR= 2488 lb 415 lb/ft → 1.7 psf
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 4976 lb

#12 Trk - Trk Max Screw Spacing 16 in
10.00 ft
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 13328 lb
POST COMPRESSION LOAD = 15901 lb

LATERAL FORCE RESISTING SYSTEM

SW-3

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL

TRANSVERSE DIRECTION

5
6.0 psf → 40.00 → 1.7 psf
LRFD SHEAR=
ASD SHEAR= 2912 lb 485 lb/ft
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 5823 lb

10.00 ft
#12 Trk - Trk Max Screw Spacing 14 in
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 18009 lb
POST COMPRESSION LOAD = 21040 lb

4
6.0 psf → 30.00 → 1.7 psf
LRFD SHEAR=
ASD SHEAR= 3335 lb 556 lb/ft
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 6670 lb

10.00 ft
#12 Trk - Trk Max Screw Spacing 12 in
SHEATHING: 33 MIL STEEL (Blkg, #10) (
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 23396 lb
POST COMPRESSION LOAD = 26884 lb

3
6.0 psf → 20.00 → 1.7 psf
LRFD SHEAR=
ASD SHEAR= 3759 lb 626 lb/ft
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 7517 lb

10.00 ft
#12 Trk - Trk Max Screw Spacing 11 in
SHEATHING: 2-side 27 MIL (UnBlk, #10)
END POST: T.B.D.
ANCHORAGE: Tie-Down
POST TENSION LOAD = 29489 lb
POST COMPRESSION LOAD = 33434 lb

2
6.0 psf → 10.00 → 1.7 psf
LRFD SHEAR=
ASD SHEAR= 4182 lb 697 lb/ft
DIAPHRAGM SHEAR = 847 lb
TOTAL SHEAR = 8364 lb

10.00 ft
3/8" x 2 1/2" Kwik-HUS-EZ= (600lb) 10 in
SHEATHING: 2-side 27 MIL (UnBlk, #10)
END POST: T.B.D.
ANCHORAGE: Tie-Down to Base Plate
POST TENSION LOAD = 36287 lb
POST COMPRESSION LOAD = 40691 lb

1

LATERAL FORCE RESISTING SYSTEM

SW-3

ASD WIND LOAD ANALYSIS ON SHEATHED SHEAR WALL **TRANSVERSE DIRECTION**

		UNFACTORED GRAVITY LOADS AT BRACED WALL END-POST			END-POST LOAD (FROM WIND ONLY)	ASD LEVEL TENSION & COMPRESSION LOADS AT BRACED WALL END-POST			
HEIGHT	LEVEL	P_{DL}	P_{DL} FOR UPLIFT	P_{LL}		CASE 5 [a] COMPRESS.	CASE 6 [b] COMPRESS.	GOVERNING COMPRESS.	CASE 8 [c] TENSION
ft		lb	lb	lb	lb	lb	lb	lb	lb
10.00	10	179	179	53	618 618	797	682	797	-510
10.00	9	465	465	133	1323 1941	2406	2021	2406	-1662
10.00	8	751	751	266	2029 3970	4721	3928	4721	-3520
10.00	7	1036	1036	399	2735 6705	7741	6364	7741	-6084
10.00	6	1322	1322	532	3441 10146	11468	9331	11468	-9353
10.00	5	1608	1608	665	4147 14293	15901	12827	15901	-13328
10.00	4	1894	1894	798	4853 19146	21040	16852	21040	-18009
10.00	3	2180	2180	931	5558 24704	26884	21406	26884	-23396
10.00	2	2466	2466	1064	6264 30968	33434	26490	33434	-29489
10.00	1	2752	2752	1197	6970 37939	40691	32104	40691	-36287

Anchor LRFD Uplift = -60754 lb

ALL LOADS ARE EVALUATED BASED ON THE ALLOWABLE STRESS REQUIREMENTS OF ASCE 7.

[a] FROM CASE 5, SECTION 2.4.1: D + Wasd
[b] FROM CASE 6, SECTION 2.4.1: D + 0.75 Wasd + 0.75 L
[c] FROM CASE 7, SECTION 2.4.1: 0.6 D - Wasd

SHEAR WALL SHEATHING TYPES

ITEM	SHEATHING TYPE	FASTENER PATTERN	NOMINAL CAPACITY	MINIMUM STUD GAUGE	MAXIMUM ASPECT RATIO		
1	NOT ADEQUATE	ERROR	50000	ERROR	ERROR	SHEATHING (WIND)	
2	27 MIL STEEL (33Ksi)	6 / 12	647	18	2		
3	(2) Gypsum	4 / 4	850	20	2		
4	15/32 PLYWOOD Blkg	6 / 12	1065	18	2		
5	15/32 PLYWOOD 7/16 OSB Blkg	4 / 12	1410	18	2		
6	15/32 PLYWOOD 7/16 OSB Blkg	3 / 12	1735	18	2		
7	2-side 27 MIL (UnBlk, #10) (33Ksi)	2 / 12	4231	12	2		
8	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2805	12	2		Note: When a
9	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2464	14	2		
10	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2110	16	2		
11	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	1962	16	2		
12	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	1713	16	2		
13	33 MIL STEEL (Blkg, #10) (33Ksi)	6 / 12	1365	16	2		
14	27 MIL STEEL (33Ksi)	2 / 12	1170	18	2		
15	27 MIL STEEL (33Ksi)	3 / 12	1085	18	2		
16	27 MIL STEEL (33Ksi)	4 / 12	1000	18	2		
17	NOT ADEQUATE	ERROR	50000	ERROR	ERROR	SHEATHING (SEISMIC)	
18	27 MIL STEEL (33Ksi)	6 / 12	647	18	2		
19	(2) Gypsum	4 / 4	850	20	2		
20	15/32 PLYWOOD 7/16 OSB Blkg	6 / 12	825	18	2		
21	15/32 PLYWOOD 7/16 OSB Blkg	4 / 12	1235	18	2		
22	15/32 PLYWOOD 7/16 OSB Blkg	3 / 12	1760	16	2		
23	15/32 PLYWOOD Blkg	2 / 12	2190	16	2		
24	2-side 27 MIL (UnBlk, #10) (33Ksi)	2 / 12	4231	12	2		
25	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2805	12	2		
26	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2464	14	2		Note: When a
27	33 MIL STEEL (Blkg, #10) (33Ksi)	2 / 12	2110	16	2		
28	33 MIL STEEL (Blkg, #10) (33Ksi)	3 / 12	1962	16	2		
29	33 MIL STEEL (Blkg, #10) (33Ksi)	4 / 12	1713	16	2		
30	33 MIL STEEL (Blkg, #10) (33Ksi)	6 / 12	1365	16	2		
31	27 MIL STEEL (33Ksi)	2 / 12	1170	18	2		
32	27 MIL STEEL (33Ksi)	3 / 12	1085	18	2		
33	27 MIL STEEL (33Ksi)	4 / 12	1000	18	2		
34	NOT ADEQUATE	ERROR	50000	ERROR	ERROR	SUREBOARD ONLY	
35	(2) SURE-BOARD	2 / 12	5011	16	2.25		
36	SURE-BOARD	2 / 12	3460	16	2.25		
37	SURE-BOARD	3 / 12	2895	16	2.25		
38	SURE-BOARD	2 / 12	2360	18	2.25		
39	SURE-BOARD	3 / 12	2145	18	2.25		
40	SURE-BOARD	4 / 12	1925	18	2.25		
41	SURE-BOARD	6 / 12	1405	18	2.25		

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FABORY

GRAINGERCHOICE

CAD

3/8"-16, Hex Head Cap Screw, 1 in Fastener Length, Grade 5 Steel, PK 50

Item #**22RZ37**

Mfr. Model # **U01000.037.0100**

UNSPSC #**31161501**

Catalog Page #2058

Country of Origin Varies. Country of Origin is subject to change.

The thick, hexagonal head design on these steel cap screws is engineered for tightening with a wre h. Use in

Web Price

$10.70 / pkg. of 50

Qty 1

Add to Cart

Shipping

Pickup

Expected to arrive **Wed. Oct 27.**

Ship to **44410** | Change

Shipping Weight **2.127 lbs**

Ship Availability Terms

Add to List

Technical Specs

Item	Hex Head Cap Screw
System of Measurement	Inch
Cap Screw Type	Hex Head Cap Screw
Basic Material	Steel
Material Grade	Grade 5
Fastener Finish	Plain
Dia./Thread Size	3/8"-16
Fastener Length	1 in
Fastener Thread Direction	Right Hand
Fastener Thread Type	UNC (Coarse)

Fastener Thread Style	Fully Threaded
Fastener Industry Standards	ASME B18.2.1
Head Type	Hex
Min. Thread Length	1 in
Head Height	15/64 in
Head Width	0.5625 in
Proof Load	74,000 to 85,000 psi
Tensile Strength	105,000 to 120,000 psi
Rockwell Hardness	C19 to C30

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3/8"-16, Hex Head Cap Screw, 2 1/4 in Fastener Length, Grade 5 Steel, PK 25

CAD

Item #**22RZ42**

Mfr. Model # **U01000.037.0225**

UNSPSC #**31161501**

Catalog Page #**N/A**

Country of Origin Varies. Country of Origin is subject to change.

The thick, hexagonal head design on these steel cap screws is engineered for tightening with a wre h. Use in

Web Price

$8.90 / pkg. of 25

Qty 1

Add to Cart

Shipping

Pickup

Expected to arrive **Wed. Oct 27.**

Ship to **44410** | Change

Shipping Weight **1.995 lbs**

Ship Availability Terms

Add to List

Technical Specs

Item	Hex Head Cap Screw
System of Measurement	Inch
Cap Screw Type	Hex Head Cap Screw
Basic Material	Steel
Material Grade	Grade 5
Fastener Finish	Plain
Dia./Thread Size	3/8"-16
Fastener Length	2 1/4 in
Fastener Thread Direction	Right Hand
Fastener Thread Type	UNC (Coarse)

Fastener Thread Style	Partially Threaded
Fastener Industry Standards	ASME B18.2.1
Head Type	Hex
Min. Thread Length	1 in
Head Height	15/64 in
Head Width	0.5625 in
Proof Load	74,000 to 85,000 psi
Tensile Strength	105,000 to 120,000 psi
Rockwell Hardness	C19 to C30

Chat with an Agent

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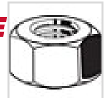
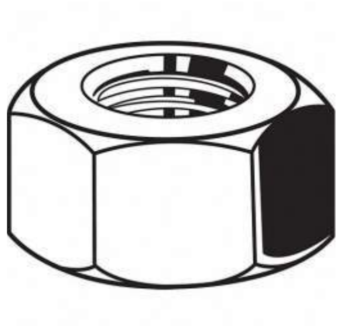


CAD



Hex Nut, Hex Nut, Steel, Grade 5, Zinc Plated, 3/8"-16 Dia./Thread Size, Right Hand, PK 100

Item #**3HEF1**

Mfr. Model # **U01300.037.0001**

UNSPSC #**31161727**

Catalog Page #2080

Country of Origin Varies. Country of Origin is subject to change.

Web Price

$8.85 / pkg. of 100

Qty 1

Add to Cart

Shipping

Pickup

Expected to arrive **Wed. Oct 27**.

Ship to **44410** | Change

Shipping Weight **1.517 lbs**

Ship Availability Terms

Add to List

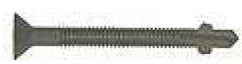
Technical Specs

Item	Hex Nut
Nut Style	Hex Nut
System of Measurement	Inch
Basic Material	Steel
Material Grade	Grade 5
Fastener Finish	Zinc Plated

Fastener Thread Direction	Right Hand
Dia./Thread Size	3/8"-16
Fastener Thread Type	UNC (Coarse)
Width Across Flats	9/16 in
Nut Height	21/64 in
Nut Standards	ASME B18.2.2

ITW BUILDEX - ITASCA, ILLINOIS
1349 W. Bryn Mawr Avenue
Itasca, IL 60143
(P) 800.848.5611
Email: marketing@itwbuildex.com

All Categories > Screws > Self-Drilling Screws > Wood-to-Metal Self-Drilling Screws > Teks® 4 WTM with Wings Wood-to-Metal Self-Drilling Screws > Part Number 1094000



larger image

Part Number 1094000, Teks® with Wings Wood-to-Metal Self-Drilling Screws - TEKS® 4 3PFH W/WINGS SPEX™ 12-24 X 2-3/4"

- Teks Drill Point
  - Non-walking, cutting edges, pigtail reduction
  - Engages material faster, drills with less effort, safer installation
- Cutting wings
  - Ream a hole in fastened wood
  - Prevents thread engagement in fastened wood while drilling
- Choice of Phillips Wafer head, Flat head, Square Driv flat head
  - Allows installer a choice of drivers
  - No need to switch drives, saves time
- Gray Climaseal™ Coating
  - Provides excellent corrosion resistance
  - Lasts longer

SPECIFICATIONS

Size	12-24 x 2-3/4"
Point Style	Teks® 4 - with wings
Drive Style	Phillips 3
Coating	Gray Climaseal™
Material	Carbon Steel
Material Attachment Range	3/4"-1-5/8" Wood, .125"-.250" Steel
Product Name	Teks® 4 with Wings
Steel Grade	C1022
Screw Color	Gray
Head Style	Flat
Head Style	Phillips 3 Flat
Wood Attachment Range	3/4-1-5/8 "
Installation Tool	Installation Tool
Screw Diameter	#12
Threads Per Inch	24
Thread Size	12 "

Thread Style	Standard
Length Under Head to Point	2-3/4 "
Max. Material Attachments	3/4"-1-5/8"
Drill & Tap Capacity	.125-.250 "
Tensile Strength	3,165 lb
Shear Stress	2,200 lb
Torque	150 in·lb
Product Family	Teks® SDF 12
Box Quantity	1,500
Carton Weight	34.19 lb
Country of Origin	Produced in the USA from Canadian Steel

Print Back

GRAINGER

Product Categories / Fasteners / Threaded Rods and Studs / Fully Threaded Rods and Studs / Steel Fully Threaded Rods and Studs / Fully Threaded Rod, Steel, 1-3/4"-12, 1 ft L...

GRAINGER APPROVED GRAINGERCHOICE

CAD

Fully Threaded Rod, Steel, 1-3/4"-12, 1 ft Length

Item #**10W543** Mfr. Model # **LC.13401201.PL.D/**

UNSPSC #**31161618** Catalog Page #**N/A**

Country of Origin USA. Country of Origin is subject to change.

Low-strength steel fully threaded rods and studs provide good strength and durability for everyday fa ening

Web Price
$26.39 / each

Qty 1

Add to Cart

Shipping Pickup

Ships from supplier. Expected to arrive on or before **Tue. Nov 09**.

Ship to **44410** | Change

Shipping Weight **7.73 lbs**

Ship Availability Terms

Add to List

Technical Specs

Item	Fully Threaded Rod	Thread Direction	Right Hand
System of Measurement	Inch	Threaded Rod Thread Type	UNF
Threaded Rod Material	Steel	Min. Tensile Strength	60,000 psi
Threaded Rod Finish	Plain	Rockwell Hardness	B85 Min
Thread Size	1-3/4"-12	Thread Class	1A
Length	1 ft	Yield Strength	45,000 psi

Chat with an Agent

FABORY

GRAINGERCHOICE

CAD

Steel Flat Washer, Plain Fastener Finish, Fits Bolt Sizes 1-3/4 in, 4 in Washer Outside Dia.

Item #**42JX97**

Mfr. Model # **B38402.175.0001**

UNSPSC #**31161807**

Catalog Page #2088

Country of Origin Varies. Country of Origin is subject to change.

Fabory Flat Washers feature 2 flat surfaces that distribute force and stress over a wider surf[illegible]e area, and

Web Price

$52.41 / pkg. of 40

Qty 1

Add to Cart

Shipping

Pickup

Expected to arrive **Wed. Oct 27**.

Ship to **44410** | Change

Shipping Weight **19.75 lbs**

Ship Availability Terms

Add to List

Technical Specs

Item	Flat Washer
Flat Washer Type	Flat Washer
Washer Basic Material	Steel
System of Measurement	Inch
Washer Material Grade	Low Carbon
Fastener Finish	Plain
Fits Bolt Sizes	1-3/4 in
Washer Inside Dia.	1 7/8 in
Washer Outside Dia.	4 in

Thickness	0.18 in
Temp. (F)	-58 Degrees to 302 Degrees F
Color	Silver
Application	General Purpose
Washer Standards	ASME B18.22.1
Package Weight	19.85
Approx. Pkg. Qty.	40
Package Quantity	40

GRAINGER

GRAINGER APPROVED GRAINGERCHOICE

Hex Nut, Hex Nut, Steel, Grade 8, Plain, 1-3/4"-12 Dia./Thread Size, Right Hand, PK 30

Item #**4VPK3** Mfr. Model #**4VPK3**

UNSPSC #**31161727** Catalog Page #**N/A**

Country of Origin Varies. Country of Origin is subject to change.

Web Price

$252.17 / pkg. of 30

Qty 1 Add to Cart

Shipping Pickup

Expected to arrive **Wed. Oct 27.**

Ship to **44410** | Change

Shipping Weight **45.3 lbs**

Ship Availability Terms

Add to List

Technical Specs

Item	Hex Nut
Nut Style	Hex Nut
System of Measurement	Inch
Basic Material	Steel
Material Grade	Grade 8
Fastener Finish	Plain

Fastener Thread Direction	Right Hand
Dia./Thread Size	1-3/4"-12
Fastener Thread Type	UNF (Fine)
Width Across Flats	2 5/8 in
Nut Height	1 15/32 in
Nut Standards	ASME B18.2.2

Chat with an Agent

ClarkDietrich Holdown (CD Series)

Secure and hold down shearwalls to the structure foundation.

ClarkDietrich holdowns provide cost-effective shearwall attachment and are used to transfer tension loads between floors or from structural members to the foundation. Two-piece welded construction comes in three sizes for optimal performance. Installation is made easy with prepunched holes.

ALTERNATIVE PRODUCTS

EasyClip™ T-Series™ Tall Anchor Clip

PRODUCT DIMENSIONS

CD8: 2-5/8" x 11"
CD10: 2-5/8" x 13-1/2"
CD15: 2-5/8" x 19"

MATERIAL SPECIFICATIONS

Gauge: 7 gauge (179 mils)
With 1/2" bearing plate
Steel Thickness: 0.1793 inches

ASTM: A36, A1011

Reference section R603.9.4.2 of the International Residential Code (IRC) for holdown requirements in residential applications. Consult the engineer of record for commercial applications.

INSTALLATION

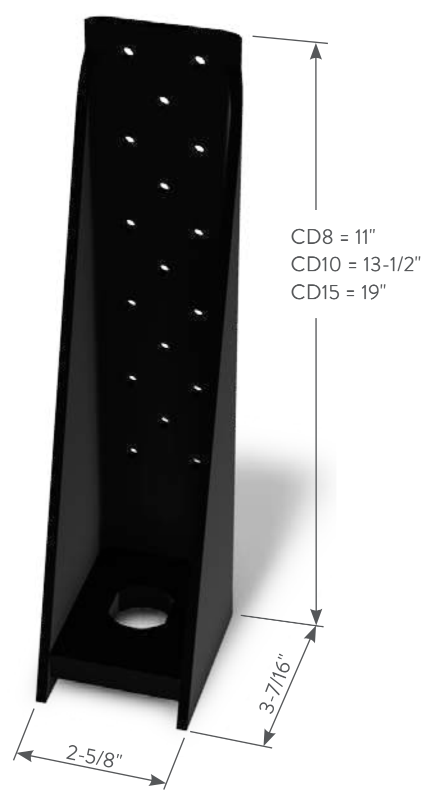
- Install the holdowns using anchor bolts or alternate anchorage calculated to resist the tension load for your specific application.
- Use steel nylon locking nuts or thread adhesive to minimize the chance of nut spin. Anchor bolt washer is not required.

INSTALLATION (*CONTINUED*)

- Secure the CD holdown to the steel framing member by filling all the prepunched holes with #14 screws to achieve listed capacities.
- Boundary members (back-to-back studs) shall be designed by a qualified professional. To tie back-to-back stud members together, the Designer must determine the fasteners required to bind members to act as one unit.
- CD holdowns can be welded per Designer's recommendation and specification.
- Welding procedures shall be qualified as specified in AWS D1.3.
- Welded connections used for cold-formed steel structural members in which the thickness of the thinnest connected part is 0.18 inch or less shall comply to AISI S100-2012 specification Section E2.

ClarkDietrich HOLDOWNS

Product code	Simpson reference	Thickness			Size (in)	Packaging
		Gauge	Mils	Design thickness (in)		
CD8	S/HD8S	7	179	0.188	2-5/8 x 11	Dependent on Order Quantity
CD10	S/HD10S	7	179	0.188	2-5/8 x 13-1/2	
CD15	S/HD15S	7	179	0.188	2-5/8 x 19	



ClarkDietrich CD8, CD10, CD15 HOLDOWNS

Product code	Height	Fasteners		Stud member thickness	ASD		LRFD		Nominal tension load (lbs)
		Anchor diameter	Stud fasteners		Tension load (lbs)	Deflection at ASD load	Tension load (lbs)	Deflection at LRFD load	
CD8	11"	7/8"	(17) #14	2-33mil (2-20ga)	6,962	0.080	11,139	0.119	20,885
				2-43mil (2-18ga)	8,164	0.070	13,062	0.124	24,492
				2-54mil (2-16ga)	11,253	0.083	18,005	0.126	33,759
				2-68mil (2-14ga)	12,240	0.095	19,585	0.135	36,721
				2-97mil (2-12ga)	12,240	0.095	19,585	0.135	36,721
CD10	13-1/2"	7/8"	(23) #14	2-33mil (2-20ga)	7,293	0.120	11,669	0.160	21,880
				2-43mil (2-18ga)	9,314	0.068	14,902	0.106	27,941
				2-54mil (2-16ga)	12,502	0.083	20,004	0.125	37,507
				2-68mil (2-14ga)	12,899	0.083	20,638	0.127	38,697
				2-97mil (2-12ga)	12,899	0.083	20,638	0.127	38,697
CD15	19"	1"	(32) #14	2-33mil (2-20ga)	7,610	0.098	12,177	0.125	22,831
				2-43mil (2-18ga)	9,235	0.067	14,776	0.104	27,705
				2-54mil (2-16ga)	13,532	0.088	21,650	0.128	40,595
				2-68mil (2-14ga)	13,695	0.063	21,911	0.096	41,084
				2-97mil (2-12ga)	13,695	0.063	21,911	0.096	41,084

Notes:

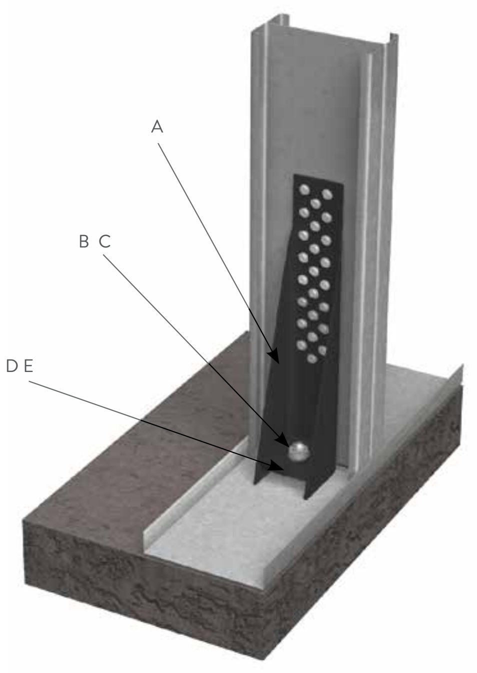
1 Designer shall specify the foundation anchor material type, length, embedment and configuration. Tabulated loads may exceed anchor bolt ASTM A36 or A307 tension capacities.

2 Stud design by qualified professional. Tabulated loads are based on a minimum stud thickness for fastener connection.

3 1/4" self-drilling screws can be substituted for #14.

4 Deflection at ASD and LRFD loads includes fastener slip, holdown elongation and anchor bolt elongation.

5 Nominal tension load is based on the average ultimate (peak) load from tests. AISI Lateral Design standard requires holdown to have nominal strength to resist lesser of amplified seismic load or what the system can deliver.



Sources of deflection at the shearwall holdown connections:

A Eccentricity in stud—when a holdown is installed on only one side of the stud, an eccentricity exists during loading that can cause additional movement in the shearwall system.

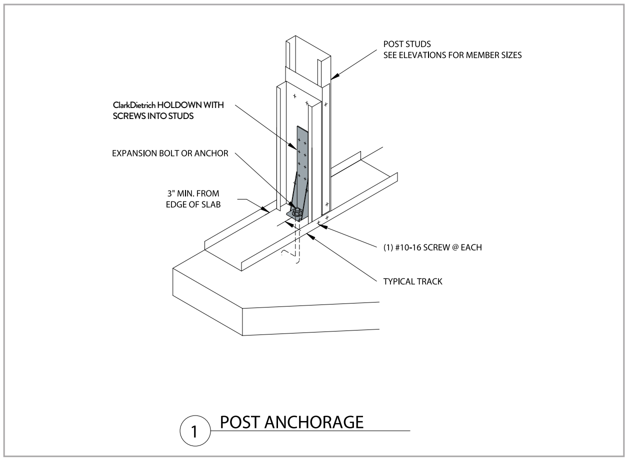
B Nut spin—unrestrained anchor bolt nuts can spin loose during cyclic loading: the use of steel nylon locking nuts or thread adhesive may prevent nut spin.

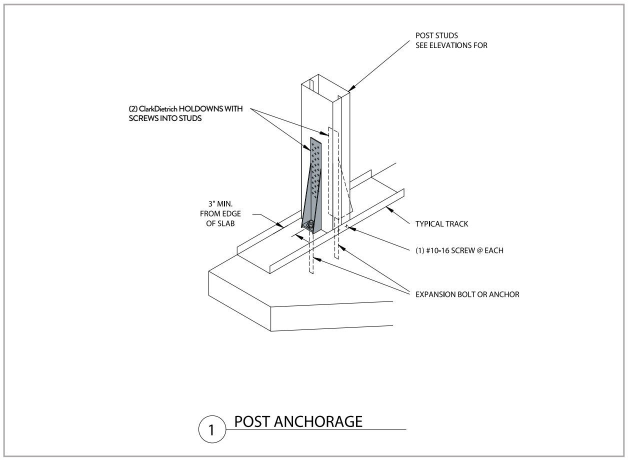
C Lack of nut tightening—additional movement can occur when nuts are not tightened sufficiently.

D Deflection of the holdown—deflection can occur in the holdown under load caused by stresses due to earthquake or high wind.

E Vertical deflection at the holdown seat caused by stud rotation—lateral displacement at the top of the wall rotates the stud around its base causing the holdown base plate to displace vertically.

Typical Construction Details





Visit our CAD Library at clarkdietrich.com to view or download construction details in .dwg, .dxf, and .pdf formats.

SIMPSON Strong-Tie®

July 10, 2009

Re: TENSION LOADS FOR SIMPSON S/HDS HOLDOWNS ATTACHED TO SINGLE DIETRICH HDS® HEAVY DUTY STUDS

To Whom It May Concern:

Table 1 provides tension loads for Simpson Strong-Tie S/HDS series holdowns attached to the flat side of single HDS® heavy duty studs manufactured by Dietrich Industries, Inc. as shown in Figure 1 below.

Table 1 – Tension Loads for Simpson S/HDS Holdowns attached to Single Dietrich HDS® Heavy Duty Studs

Model No.	H	Fasteners		Dietrich Stud Member Thickness mil (ga)	ASD		LRFD		Nominal Tension Load
		Fdn Anchor Dia	Stud Fasteners		Tension Load	Deflection at ASD Load	Tension Load	Deflection at LRFD Load	
S/HD8S	11	7/8	17 - #14	33 (20ga)	3080	0.075	4920	0.124	5760
				43 (18ga)	4125	0.101	6590	0.177	7720
				54 (16ga)	7285	0.098	11160	0.173	13925
				68 (14ga)	7285	0.085	11160	0.141	17855
				97 (12ga)	10065	0.100	16075	0.147	24655
S/HD10S	13½	7/8	22 - #14	43 (18ga)	5060	0.059	8085	0.100	9465
				54 (16ga)	8675	0.095	13855	0.162	16220
				68 (14ga)	8840	0.088	14120	0.147	21655
				97 (12ga)	12225	0.088	19530	0.143	29955
S/HD15S	17	1	30 - #14	68 (14ga)	13495	0.087	21550	0.147	25235
				97 (12ga)	14025	0.096	22400	0.142	34355

1. Dietrich HDS® heavy duty studs manufactured by Dietrich Industries, Inc. See evaluation reportE SR-2374.
2. Designer shall specify the foundation anchor material type,le ngth,e mbedment and configuration.T abulated loads may exceed typical anchor bolt of ASTM A36 or A307 tension capacities.
3. Stud design by Specifier. Tabulated loads are based on a minimum stud thickness for fastener connection.
4. 1/4" self-drilling screws can be substituted for #14.
5. Deflection at ASD and LRFD Loads is the deflection of the holdown measured between the anchor bolt and strap portion of the holdown when loaded to the ASD and LRFD load respectively. This movement is strictly due to the holdown deformation under a static load test attached to members listed in the table above.
6. Nominal Tension Load is based on the average ultimate (peak) load from tests. AISI Lateral Design standard requires holdown to have nominal strength to resist lesser of amplified seismic load or what the system can deliver.

Please note: the information in this letter is valid until **12/31/2010** when it will be reevaluated by Simpson Strong-Tie. Refer to the current Simpson Strong-Tie *Cold-Formed Steel Connectors* catalog for additional pertinent information. If you have any other questions or need further assistance regarding this matter, please contact the engineering department of Simpson Strong-Tie at 1-800-999-5099.

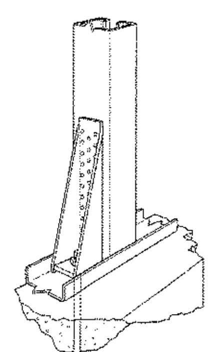


Figure 1

Sincerely,

SIMPSON STRONG-TIE CO., INC.

L-SHDSDIETRICH

Simpson Strong-Tie Co., Inc. 5956 West Las Positas Boulevard Pleasanton, California, 94588 Phone: 800.999.5099 www.strongtie.com

USP Stock No.	Ref. No.	Steel Gauge	Dimensions (in)				Fastener Schedule					Metal Stud Member[4] Mils (Gauge)	ASD (Lbs.)		LRFD (Lbs.)	
			W	H	D	CL	Anchor Bolt[1] Qty	Anchor Bolt[1] Dia (in)	Min/ Max	Stud Qty	Stud Type[3]		Tension Load	Deflection at ASD Load (in)	Tension Load	Deflection at LRFD Load (in)
S/PHD4	S/HDU4	14	2-3/8	7-3/4	3-1/4	1-3/8	1	5/8	Min	6	#14	2-33 (20Ga)	2255	0.080	3605	0.118
												2-43 (18Ga)	3145	0.103	5035	0.148
												2-54 (16Ga)	4355	0.140	6970	0.205
									Max	8	#14	2-33 (20Ga)	2960	0.088	4740	0.133
												2-43 (18Ga)	4345	0.076	6950	0.131
												2-54 (16Ga)	5385	0.138	8620	0.216
S/PHD6	S/HDU6	14	2-3/8	10-3/8	3-1/4	1-3/8	1	5/8	Min	12	#14	2-33 (20Ga)	4965	0.102	7945	0.177
												2-43 (18Ga)	5490	0.104	8785	0.160
												2-54 (16Ga)	7345	0.120	11750	0.214
									Max	14	#14	2-33 (20Ga)	5440	0.088	8700	0.168
												2-43 (18Ga)	6275	0.096	10040	0.156
												2-54 (16Ga)	7350	0.127	11755	0.218
S/PHD9	S/HDU9	12	2-3/8	12-3/4	3-1/4	1-3/8	1	7/8	--	18	#14	2-33 (20Ga)	6495	0.096	10390	0.154
												2-43 (18Ga)	8875	0.112	14195	0.191
												2-54 (16Ga)	10850	0.103	17365	0.165

1) The designer must specify the anchor bolt type, length and embedment.
2) Deflections are derived from static, monotonic load tests of device connected to a 2-ply cold formed steel stud and include fastener slip, holdown elongation and anchor bolt elongation (L = 4").
3) #14 screws are self-drilling tapping screws for cold-formed steel construction.
4) The designer must specify the metal stud size and mil thickness.

Allowable Weld/Screw Design Values (lb.)

Gage	Design Thk (in.)	Fy (ksi	Fu (ksi)	Welds Fillet	Welds Flare Groove	#10 Screws (.19" Dia.) Shear	#10 Pullover 1-Side	#10 Pullover 2-Side	#10 Pullout	#12 Screws (.21" Dia.) Shear	#12 Pullover 1-Side	#12 Pullover 2-Side	#12 Pullout	1/4" Dia. Screws Shear	1/4" Pullover 1-Side	1/4" Pullover 2-Side	1/4" Pullout
25	0.0188	33	45	---	---	71	79	159	46	75	106	212	50	80	106	212	58
22	0.0283	33	45	---	---	131	119	239	69	138	159	319	76	147	159	319	87
20-Drywall	0.0312	33	45	---	---	151	131	263	75	159	175	351	83	170	175	351	95
25-UltraSTEEL	0.0158	40	55	---	---	67	81	163	47	70	109	217	52	75	109	217	59
20-UltraSTEEL	0.0263	40	55	---	---	143	136	271	78	151	181	362	86	161	181	362	98
20X-UltraSTEEL	0.0295	40	55	---	---	170	152	304	87	179	203	405	96	191	203	405	110
20	0.0346	33	45	---	---	177	146	292	84	186	195	390	93	199	195	390	106
18	0.0451	33	45	499	543	263	190	380	109	276	253	507	121	295	253	507	138
16	0.0566	33	45	627	683	370	239	478	137	389	319	637	152	416	319	637	173
		50	65	905	986	467	345	690	198	562	460	920	219	601	460	920	250
14	0.0713	33	45	789	859	467	301	601	173	549	401	802	191	587	401	802	218
		50	65	1139	1241	467	434	700	249	667	579	933	276	848	579	1158	315
12	0.1017	33	45	1125	897	467	429	700	246	667	572	933	272	867	572	1144	311
		50	65	1269	897	467	620	700	356	667	826	933	393	867	826	1283	449
10	0.1242	33	45	1550	1096	467	524	700	301	667	699	933	333	867	699	1283	380
		50	65	1550	1096	467	700	700	435	667	933	933	480	867	1009	1283	549

Gage	Design Thk (in.)	Fy (ksi	Fu (ksi)	#8 Screws (.16" Dia.) Shear	#8 Pullover 1-Side	#8 Pullover 2-Side	#8 Pullout	#7 Screws (.15" Dia.) Shear	#7 Pullover 1-Side	#7 Pullover 2-Side	#7 Pullout
25	0.0188	33	45	65	53	106	38	63	53	106	36
22	0.0283	33	45	120	80	159	58	116	80	159	54
20-Drywall	0.0312	33	45	139	88	175	64	134	88	175	60
25-UltraSTEEL	0.0158	40	55	61	54	109	39	59	54	109	37
20-UltraSTEEL	0.0263	40	55	131	90	181	66	127	90	181	62
20X-UltraSTEEL	0.0295	40	55	156	101	203	73	151	101	203	69
20	0.0346	33	45	162	97	195	71	157	97	195	66
18	0.0451	33	45	241	127	253	92	233	127	253	86
16	0.0566	33	45	333	159	319	116	290	159	319	108
		50	65	333	230	460	167	290	230	460	156
14	0.0713	33	45	333	200	401	145	290	200	401	136
		50	65	333	290	525	210	290	290	460	197
12	0.1017	33	45	333	286	525	207	290	286	460	194
		50	65	333	413	525	300	290	413	460	281
10	0.1242	33	45	333	349	525	253	290	349	460	238
		50	65	333	505	525	366	290	460	460	343

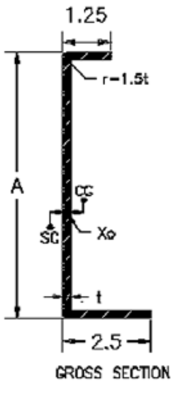
Notes:
1) All values are calculated per the 2001 AISI Specification with 2004 Supplement
2) Weld strength is given in lb./in.
3) Weld strength is based on E60XX electrodes.
4) Shear strength for #7, # 8, #10, #12, and 1/4" screws must be greater than or equal to 870 lb., 1000 lb., 1400 lb., 2000 lb., and 2600 lb. respectively.
5) Tension strength for #7, # 8, #10, #12, and 1/4" screws must be greater than or equal to 1380 lb., 1575 lb., 2100 lb., 2800 lb., and 3850 lb. respectively.
6) The minimum head diameter for #7 and #8 screws is 1/4". The minimum head diameter for #10 screws is 3/8". The minimum head diameter for #12 and 1/4" screws is 1/2".

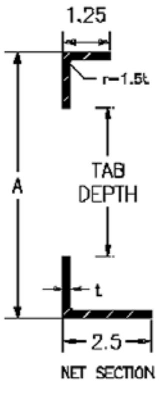
Structural Properties of TradeReady® Rim Track

SECTION	DIMENSION		FULLY EFFECTIVE GROSS SECTION PROPERTIES												NET SECTION PROPERTIES		CAPACITY @ HOLE		
ID	A, in.	t, in.	Area, in^2	Weight, lb/ft	Ix, in^4	Iy, in^4	Sx, in^3	Sy, in^3	X, in	Xo, in	J, in^4	Cw, in^6	Ro, in	β	Area', in^2	Ix', in^4	Mpos, in-lbs.	Mneg, in-lbs.	Va, lbs
TD 7.25 x 18	7.34	0.0451	0.493	1.612	3.550	0.196	0.868	0.092	0.350	-0.738	0.000334	0.822	3.500	1.060	0.312	3.260	8829	9040	591
TD 7.25 x 16	7.36	0.0566	0.617	2.019	4.448	0.244	1.085	0.115	0.349	-0.736	0.000659	1.020	3.503	1.060	0.391	4.083	17414	17861	1173
TD 7.25 x 14	7.39	0.0713	0.776	2.537	5.591	0.305	1.358	0.144	0.347	-0.732	0.001314	1.265	3.506	1.060	0.490	5.131	26184	27334	2335
TD 7.25 x 12	7.45	0.1017	1.103	3.610	7.974	0.427	1.921	0.203	0.343	-0.722	0.003804	1.755	3.517	1.058	0.697	7.316	46644	51102	5875
TD 8 x 18	8.09	0.0451	0.526	1.722	4.506	0.200	1.007	0.093	0.328	-0.698	0.000357	1.028	3.824	1.048	0.346	4.215	9754	9954	597
TD 8 x 16	8.11	0.0566	0.660	2.158	5.646	0.249	1.258	0.116	0.326	-0.695	0.000704	1.276	3.827	1.047	0.433	5.280	19241	19671	1185
TD 8 x 14	8.14	0.0713	0.829	2.712	7.097	0.311	1.575	0.145	0.325	-0.692	0.001405	1.058	3.831	1.047	0.544	6.635	29049	30211	2362
TD 8 x 12	8.20	0.1017	1.180	3.859	10.117	0.436	2.229	0.205	0.321	-0.682	0.004067	2.194	3.843	1.046	0.773	9.456	52239	56911	6588
TD 9.25 x 18	9.34	0.0451	0.583	1.907	6.434	0.205	1.257	0.094	0.296	-0.640	0.000395	1.429	4.376	1.033	0.402	6.141	11230	11423	584
TD 9.25 x 16	9.36	0.0566	0.730	2.389	8.060	0.256	1.571	0.118	0.295	-0.637	0.000780	1.772	4.380	1.033	0.504	7.692	22157	22578	1161
TD 9.25 x 14	9.39	0.0713	0.918	3.004	10.131	0.320	1.968	0.147	0.293	-0.634	0.001556	2.113	4.717	1.028	0.633	9.666	33594	34805	2317
TD 9.25 x 12	9.45	0.1017	1.307	4.275	14.435	0.448	2.786	0.207	0.290	-0.625	0.004505	3.047	4.399	1.032	0.900	13.770	61000	66079	6737
TD 10 x 16	10.11	0.0566	0.773	2.528	9.779	0.260	1.773	0.118	0.279	-0.607	0.000825	2.113	4.717	1.027	0.433	8.632	24471	25145	788
TD 10 x 14	10.14	0.0713	0.972	3.179	12.291	0.324	2.221	0.148	0.277	-0.631	0.001647	2.621	4.722	1.028	0.544	10.844	36997	38669	1567
TD 10 x 12	10.20	0.1017	1.383	4.525	17.510	0.454	3.146	0.209	0.274	-0.595	0.004768	3.631	4.738	1.026	0.773	15.444	66707	72999	4544
TD 11.25 x 16	11.36	0.0566	0.844	2.760	13.132	0.265	2.133	0.119	0.255	-0.563	0.000901	2.753	5.286	1.020	0.504	11.986	27453	28117	811
TD 11.25 x 14	11.39	0.0713	1.061	3.471	16.505	0.330	2.674	0.149	0.254	-0.559	0.001798	3.415	5.292	1.020	0.633	15.060	41675	43395	1615
TD 11.25 x 12	11.45	0.1017	1.510	4.941	23.508	0.463	3.789	0.210	0.251	-0.551	0.005206	4.729	5.311	1.020	0.900	21.444	75860	82560	4689
TD 12 x 16	12.11	0.0566	0.886	2.899	15.457	0.267	2.364	0.120	0.243	-0.539	0.000946	3.181	5.630	1.017	0.546	14.311	29181	29849	811
TD 12 x 14	12.14	0.0713	1.114	3.645	19.427	0.334	2.964	0.150	0.242	-0.536	0.001888	3.946	5.637	1.017	0.686	17.982	44370	46135	1617
TD 12 x 12	12.20	0.1017	1.586	5.190	27.667	0.467	4.201	0.211	0.239	-0.528	0.005469	5.462	5.657	1.016	0.976	25.603	81073	88046	4698
TD 14 x 14	14.14	0.0713	1.257	4.112	28.791	0.341	3.803	0.152	0.214	-0.482	0.002130	5.561	6.567	1.011	0.829	27.346	51330	53261	1574
TD 14 x 12	14.20	0.1017	1.790	5.856	40.996	0.478	5.392	0.214	0.211	-0.474	0.006171	7.693	6.590	1.011	1.180	38.936	94430	102214	4577

Notes:
- Ix - Fully Effective Moment of Interia about X axis
- Iy - Fully Effective Moment of Interia about Y axis
- Sx - Fully Effecitve Section Modulus about X axis (small flange)
- Sy - Fully Effective Section Modulus about Y axis (flange side)
- X - Distance Between Centroid and Web Centerline
- Xo - Distance Between Centroid and Shear Center
- J - St. Venant Torsional Constant
- Cw - Warping Constant
- Ix' - Fully Effective Moment of Inertia at Knockout about X axis
- Mpos - Fully Braced Allowable Moment at Hole when Small Flange is in Compression
- Mneg - Fully Braced Allowable Moment at Hole when Large Flange is in Compression
- Va - Allowable Shear at Hole
- Fy - 33 ksi for 18 ga. and 50 ksi for 16, 14, 12, and 10 ga.

Tab depth = 4.00 inches (joist depth upto 9.25 inches)
6.00 inches (joist depth greater than 9.25 inches)





Important Information

USP Stock No.	Ref. No.	Steel Gauge	Dimensions (in)				Fastener Schedule					Metal Stud Member[4] Mils (Gauge)	ASD (Lbs.)		LRFD (Lbs.)	
			W	H	D	CL	Anchor Bolt[1]		Min/ Max	Stud			Tension Load	Deflection at ASD Load (in)	Tension Load	Deflection at LRFD Load (in)
							Qty	Dia (in)		Qty	Type[3]					
S/PHD4	S/HDU4	14	2-3/8	7-3/4	3-1/4	1-3/8	1	5/8	Min	6	#14	2-33 (20Ga)	2255	0.080	3605	0.118
												2-43 (18Ga)	3145	0.103	5035	0.148
												2-54 (16Ga)	4355	0.140	6970	0.205
									Max	8	#14	2-33 (20Ga)	2960	0.088	4740	0.133
												2-43 (18Ga)	4345	0.076	6950	0.131
												2-54 (16Ga)	5385	0.138	8620	0.216
S/PHD6	S/HDU6	14	2-3/8	10-3/8	3-1/4	1-3/8	1	5/8	Min	12	#14	2-33 (20Ga)	4965	0.102	7945	0.177
												2-43 (18Ga)	5490	0.104	8785	0.160
												2-54 (16Ga)	7345	0.120	11750	0.214
									Max	14	#14	2-33 (20Ga)	5440	0.088	8700	0.168
												2-43 (18Ga)	6275	0.096	10040	0.156
												2-54 (16Ga)	7350	0.127	11755	0.218
S/PHD9	S/HDU9	12	2-3/8	12-3/4	3-1/4	1-3/8	1	7/8	--	18	#14	2-33 (20Ga)	6495	0.096	10390	0.154
												2-43 (18Ga)	8875	0.112	14195	0.191
												2-54 (16Ga)	10850	0.103	17365	0.165

1) The designer must specify the anchor bolt type, length and embedment.
2) Deflections are derived from static, monotonic load tests of device connected to a 2-ply cold formed steel stud and include fastener slip, holdown elongation and anchor bolt elongation (L = 4").
3) #14 screws are self-drilling tapping screws for cold-formed steel construction.
4) The designer must specify the metal stud size and mil thickness.

Allowable Weld/Screw Design Values (lb.)

Gage	Design Thk (in.)	Fy (ksi	Fu (ksi)	Welds		#10 Screws (.19" Dia.)				#12 Screws (.21" Dia.)				1/4" Dia. Screws			
				Fillet	Flare Groove	Shear	Pullover 1-Side	Pullover 2-Side	Pullout	Shear	Pullover 1-Side	Pullover 2-Side	Pullout	Shear	Pullover 1-Side	Pullover 2-Side	Pullout
25	0.0188	33	45	---	---	71	79	159	46	75	106	212	50	80	106	212	58
22	0.0283	33	45	---	---	131	119	239	69	138	159	319	76	147	159	319	87
20-Drywall	0.0312	33	45	---	---	151	131	263	75	159	175	351	83	170	175	351	95
25-UltraSTEEL	0.0158	40	55	---	---	67	81	163	47	70	109	217	52	75	109	217	59
20-UltraSTEEL	0.0263	40	55	---	---	143	136	271	78	151	181	362	86	161	181	362	98
20X-UltraSTEEL	0.0295	40	55	---	---	170	152	304	87	179	203	405	96	191	203	405	110
20	0.0346	33	45	---	---	177	146	292	84	186	195	390	93	199	195	390	106
18	0.0451	33	45	499	543	263	190	380	109	276	253	507	121	295	253	507	138
16	0.0566	33	45	627	683	370	239	478	137	389	319	637	152	416	319	637	173
		50	65	905	986	467	345	690	198	562	460	920	219	601	460	920	250
14	0.0713	33	45	789	859	467	301	601	173	549	401	802	191	587	401	802	218
		50	65	1139	1241	467	434	700	249	667	579	933	276	848	579	1158	315
12	0.1017	33	45	1125	897	467	429	700	246	667	572	933	272	867	572	1144	311
		50	65	1269	897	467	620	700	356	667	826	933	393	867	826	1283	449
10	0.1242	33	45	1550	1096	467	524	700	301	667	699	933	333	867	699	1283	380
		50	65	1550	1096	467	700	700	435	667	933	933	480	867	1009	1283	549

Gage	Design Thk (in.)	Fy (ksi	Fu (ksi)	#8 Screws (.16" Dia.)				#7 Screws (.15" Dia.)			
				Shear	Pullover 1-Side	Pullover 2-Side	Pullout	Shear	Pullover 1-Side	Pullover 2-Side	Pullout
25	0.0188	33	45	65	53	106	38	63	53	106	36
22	0.0283	33	45	120	80	159	58	116	80	159	54
20-Drywall	0.0312	33	45	139	88	175	64	134	88	175	60
25-UltraSTEEL	0.0158	40	55	61	54	109	39	59	54	109	37
20-UltraSTEEL	0.0263	40	55	131	90	181	66	127	90	181	62
20X-UltraSTEEL	0.0295	40	55	156	101	203	73	151	101	203	69
20	0.0346	33	45	162	97	195	71	157	97	195	66
18	0.0451	33	45	241	127	253	92	233	127	253	86
16	0.0566	33	45	333	159	319	116	290	159	319	108
		50	65	333	230	460	167	290	230	460	156
14	0.0713	33	45	333	200	401	145	290	200	401	136
		50	65	333	290	525	210	290	290	460	197
12	0.1017	33	45	333	286	525	207	290	286	460	194
		50	65	333	413	525	300	290	413	460	281
10	0.1242	33	45	333	349	525	253	290	349	460	238
		50	65	333	505	525	366	290	460	460	343

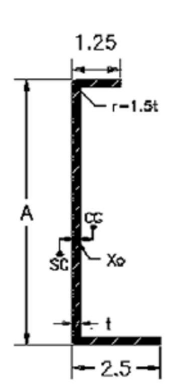
Notes:
1) All values are calculated per the 2001 AISI Specification with 2004 Supplement
2) Weld strength is given in lb./in.
3) Weld strength is based on E60XX electrodes.
4) Shear strength for #7, # 8, #10, #12, and 1/4" screws must be greater than or equal to 870 lb., 1000 lb., 1400 lb., 2000 lb., and 2600 lb. respectively.
5) Tension strength for #7, # 8, #10, #12, and 1/4" screws must be greater than or equal to 1380 lb., 1575 lb., 2100 lb., 2800 lb., and 3850 lb. respectively.
6) The minimum head diameter for #7 and #8 screws is 1/4". The minimum head diameter for #10 screws is 3/8". The minimum head diameter for #12 and 1/4" screws is 1/2".

Structural Properties of TradeReady® Rim Track

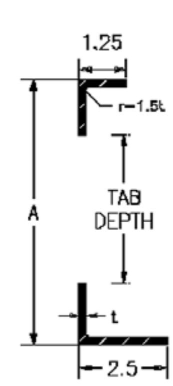
SECTION	DIMENSION		FULLY EFFECTIVE GROSS SECTION PROPERTIES												NET SECTION PROPERTIES		CAPACITY @ HOLE		
ID	A, in.	t, in.	Area, in^2	Weight, lb/ft	Ix, in^4	Iy, in^4	Sx, in^3	Sy, in^3	X, in	Xo, in	J, in^4	Cw, in^6	Ro, in	β	Area', in^2	Ix', in^4	Mpos, in-lbs.	Mneg, in-lbs.	Va, lbs
TD 7.25 x 18	7.34	0.0451	0.493	1.612	3.550	0.196	0.868	0.092	0.350	-0.738	0.000334	0.822	3.500	1.060	0.312	3.260	8829	9040	591
TD 7.25 x 16	7.36	0.0566	0.617	2.019	4.448	0.244	1.085	0.115	0.349	-0.736	0.000659	1.020	3.503	1.060	0.391	4.083	17414	17861	1173
TD 7.25 x 14	7.39	0.0713	0.776	2.537	5.591	0.305	1.358	0.144	0.347	-0.732	0.001314	1.265	3.506	1.060	0.490	5.131	26184	27334	2335
TD 7.25 x 12	7.45	0.1017	1.103	3.610	7.974	0.427	1.921	0.203	0.343	-0.722	0.003804	1.755	3.517	1.058	0.697	7.316	46644	51102	5875
TD 8 x 18	8.09	0.0451	0.526	1.722	4.506	0.200	1.007	0.093	0.328	-0.698	0.000357	1.028	3.824	1.048	0.346	4.215	9754	9954	597
TD 8 x 16	8.11	0.0566	0.660	2.158	5.646	0.249	1.258	0.116	0.326	-0.695	0.000704	1.276	3.827	1.047	0.433	5.280	19241	19671	1185
TD 8 x 14	8.14	0.0713	0.829	2.712	7.097	0.311	1.575	0.145	0.325	-0.692	0.001405	1.058	3.831	1.047	0.544	6.635	29049	30211	2362
TD 8 x 12	8.20	0.1017	1.180	3.859	10.117	0.436	2.229	0.205	0.321	-0.682	0.004067	2.194	3.843	1.046	0.773	9.456	52239	56911	6588
TD 9.25 x 18	9.34	0.0451	0.583	1.907	6.434	0.205	1.257	0.094	0.296	-0.640	0.000395	1.429	4.376	1.033	0.402	6.141	11230	11423	584
TD 9.25 x 16	9.36	0.0566	0.730	2.389	8.060	0.256	1.571	0.118	0.295	-0.637	0.000780	1.772	4.380	1.033	0.504	7.692	22157	22578	1161
TD 9.25 x 14	9.39	0.0713	0.918	3.004	10.131	0.320	1.968	0.147	0.293	-0.634	0.001556	2.113	4.717	1.028	0.633	9.666	33594	34805	2317
TD 9.25 x 12	9.45	0.1017	1.307	4.275	14.435	0.448	2.786	0.207	0.290	-0.625	0.004505	3.047	4.399	1.032	0.900	13.770	61000	66079	6737
TD 10 x 16	10.11	0.0566	0.773	2.528	9.779	0.260	1.773	0.118	0.279	-0.607	0.000825	2.113	4.717	1.027	0.433	8.632	24471	25145	788
TD 10 x 14	10.14	0.0713	0.972	3.179	12.291	0.324	2.221	0.148	0.277	-0.631	0.001647	2.621	4.722	1.028	0.544	10.844	36997	38669	1567
TD 10 x 12	10.20	0.1017	1.383	4.525	17.510	0.454	3.146	0.209	0.274	-0.595	0.004768	3.631	4.738	1.026	0.773	15.444	66707	72999	4544
TD 11.25 x 16	11.36	0.0566	0.844	2.760	13.132	0.265	2.133	0.119	0.255	-0.563	0.000901	2.753	5.286	1.020	0.504	11.986	27453	28117	811
TD 11.25 x 14	11.39	0.0713	1.061	3.471	16.505	0.330	2.674	0.149	0.254	-0.559	0.001798	3.415	5.292	1.020	0.633	15.060	41675	43395	1615
TD 11.25 x 12	11.45	0.1017	1.510	4.941	23.508	0.463	3.789	0.210	0.251	-0.551	0.005206	4.729	5.311	1.020	0.900	21.444	75860	82560	4689
TD 12 x 16	12.11	0.0566	0.886	2.899	15.457	0.267	2.364	0.120	0.243	-0.539	0.000946	3.181	5.630	1.017	0.546	14.311	29181	29849	811
TD 12 x 14	12.14	0.0713	1.114	3.645	19.427	0.334	2.964	0.150	0.242	-0.536	0.001888	3.946	5.637	1.017	0.686	17.982	44370	46135	1617
TD 12 x 12	12.20	0.1017	1.586	5.190	27.667	0.467	4.201	0.211	0.239	-0.528	0.005469	5.462	5.657	1.016	0.976	25.603	81073	88046	4698
TD 14 x 14	14.14	0.0713	1.257	4.112	28.791	0.341	3.803	0.152	0.214	-0.482	0.002130	5.561	6.567	1.011	0.829	27.346	51330	53261	1574
TD 14 x 12	14.20	0.1017	1.790	5.856	40.996	0.478	5.392	0.214	0.211	-0.474	0.006171	7.693	6.590	1.011	1.180	38.936	94430	102214	4577

Notes:

Ix	-	Fully Effective Moment of Interia about X axis
Iy	-	Fully Effective Moment of Interia about Y axis
Sx	-	Fully Effecitve Section Modulus about X axis (small flange)
Sy	-	Fully Effective Section Modulus about Y axis (flange side)
X	-	Distance Between Centroid and Web Centerline
Xo	-	Distance Between Centroid and Shear Center
J	-	St. Venant Torsional Constant
Cw	-	Warping Constant
Ix'	-	Fully Effective Moment of Inertia at Knockout about X axis
Mpos	-	Fully Braced Allowable Moment at Hole when Small Flange is in Compression
Mneg	-	Fully Braced Allowable Moment at Hole when Large Flange is in Compression
Va	-	Allowable Shear at Hole
Fy	-	33 ksi for 18 ga. and 50 ksi for 16, 14, 12, and 10 ga.
Tab depth	=	4.00 inches (joist depth upto 9.25 inches) 6.00 inches (joist depth greater than 9.25 inches)



GROSS SECTION



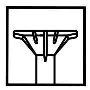
NET SECTION

Product #290

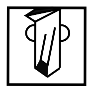
GRABBER® USG® Structural Panel fastener (1 OF 2)

Designed for USG Structural Panels.

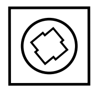
Finish - GRABBERGARD



Wafer Head



Drill Point



LOX #2

APPLICATIONS

- For attachment of sheathing, siding, OSB or plywood to steel.

PRODUCT FEATURES

- The USG Structural Panel screw has "reamer nibs" under the head to ease countersinking and leave smooth clean edges.
- Wings allow the screw to drill into the metal without clogging the threads and racking/lifting the material before it penetrates through the metal.

SPECIFICATIONS

- Gauge - #8
- Length – 1-1/4" to 2-3/8"
- Head Type – Thin Wafer
- Recess Type – LOX® #2
- Thread Type – Single Lead
- Finish –GRABBERGARD
- Head diameter - .362 inch
- GRABBER screws are manufactured in an ISO 9001 and ISO 14001 certified and approved factory, and are approved by ICC ESR report ESR-4223.

INSTALLATION GUIDELINES

- Use a standard screwgun with a depth-sensitive nose piece. Suggested screwgun specification for optimal performance – 4 amps minimum and RPM range of 0 to 4,000.
- Proper depth setting is paramount in this application.
- Overdriving may result in failure of the fastener or stripout of the work surface.
- The fastener must penetrate beyond the metal a minimum of three thread pitches.

Product #290

GRABBER® USG® Structural Panel fastener (2 OF 2)

PRODUCT SIZES AND ORDERING INFORMATION

Catalog No.	Gauge/Length	Length Metric	Quantity Per Carton	Weight Per Carton
CGH8114LG	#8x1-1/4"	32 mm	1 M	
CGH8158LG	#8x1-5/8"	41 mm	1 M	
CGH8238LG	#8x2-3/8"	63 mm	1 M	
GH8114LG	#8x1-1/4"	32 mm	5 M	32.00(lbs)
GH8158LG	#8x1-5/8"	41 mm	4 M	30.00(lbs)
GH8238LG	#8x2-3/8"	63 mm	3 M	30.00(lbs)

*Collated screw packaging option available on selected items.

PRODUCT DIMENSIONS (MILLIMETERS)

Gauge	B Head Dia	Recess Depth	W Gauging Width	d Shank Dia	d1 Minor Dia	d2 Major Dia	TPI
#8	7.77	1.80	#2	3.28	2.85	4.05	18
	8.18	2.46		3.32	3.05	4.25	

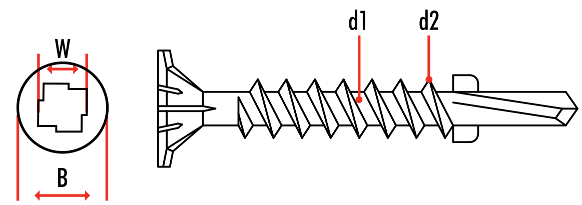
STANDARD CORROSION TEST RESULTS

Finish	Test	Standard/Protocol	Results
GRABBERGARD	Salt Spray Results	ASTM B117	1,000 hours, no red rust
GRABBERGARD	Kesternich Results	DIN 50018, 2.0L	15 cycles, no red rust

Pull-out and Shear Test Data**

Screw Gauge	Metal Gauge	Tension (lbs.)	Shear (lbs.)
#8	14	450	1012
	16	442	955
	18	340	1045

**GRABBER fasteners are not categorized as structural bolts. The figures listed above are ultimate average values achieved under independent laboratory conditions, and apply to GRABBER Line fasteners only. An appropriate safety factor must be determined by a qualified professional for design purposes.



DRILLING CAPACITY

Screw Gauge	Drill Point	Max Panel Thickness	Steel Thickness Gauge Range
8	3	0.100-0.140	20-12

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 17.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.
US: http://submittals.us.hilti.com/PTGVol2/
CA: http://submittals.us.hilti.com/PTGVol2CA/

To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.
US: 877-749-6337 or HNATechnicalServices@hilti.com
CA: 1-800-363-4458, ext. 6 or CATechnicalServices@hilti.com

Hilti, Inc.
7250 Dallas Parkway, Suite 1000
Plano, TX 75024

1-800-879-8000
www.hilti.com

3.3.6.1 Product description

KWIK HUS-EZ (KH-EZ) anchors are comprised of a body with hex washer head. The anchor is manufactured from carbon steel and is heat treated. It has a minimum 0.0003 inch (8 μm) zinc coating in accordance with DIN EN ISO 4042. The KWIK HUS-EZ (KH-EZ) system is available in a variety of lengths with diameters of 1/4-, 3/8-, 1/2-, 5/8- and 3/4-in. The hex head is larger than the diameter of the anchor and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the concrete on the sides of the hole and interlock with the base material during installation. Applicable base materials include normal-weight concrete, structural lightweight concrete, lightweight concrete over metal deck, and grout-filled concrete masonry.

Guide specifications

Screw anchors shall be KWIK HUS-EZ as supplied by Hilti, Inc. Anchors shall be manufactured from heat treated carbon steel material, zinc plated to a minimum thickness of 8 μm. Anchor head shall display name of manufacturer, product name, diameter and length. Anchors shall be installed using a drill bit of same nominal diameter as anchor.

Product features

- Suitable for seismic and nonseismic loads.
- Quick and easy to install.
- Length and diameter identification clearly stamped on head facilitates quality control and inspection after installation.
- Through fixture installation improves productivity and accurate installation.
- Thread design enables quality setting and exceptional load values in wide variety of base material strengths.
- Anchor is fully removable
- Anchor size is same as drill bit size.
- Suitable for reduced edge distances and spacing.

3.3.6.2 Material specifications

Hilti KWIK HUS-EZ anchors are manufactured from carbon steel. The anchors are bright zinc plated to a minimum thickness of 8 μm.

3.3.6.3 Technical data

3.3.6.3.1 ACI 318-14 Chapter 17 design

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Method, refer to section 3.1.8. Data tables from ESR-3027 are not contained in this section, but can be found on www.icc-es.org or at www.hilti.com.

Listings/Approvals

ICC-ES (International Code Council)
ESR-3027
Cracked and Uncracked Concrete
ESR-3056
Grout-filled concrete masonry
City of Los Angeles
Research Report No. 25897

Independent code evaluation

IBC® / IRC® 2015
IBC® / IRC® 2012
IBC® / IRC® 2009
IBC® / IRC® 2006
IBC® / IRC® 2003

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 1 - Hilti KWIK HUS-EZ specifications[1]

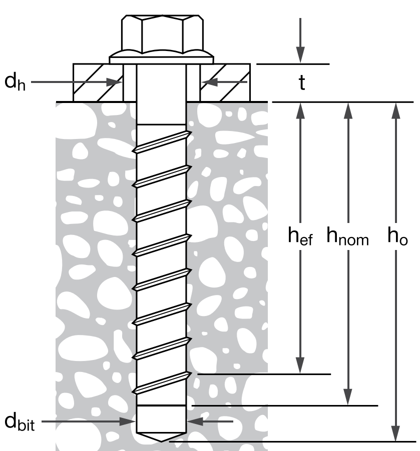
Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Nominal bit diameter	d_{bit}		1/4		3/8			1/2			5/8		3/4	
Minimum nominal embedment	h_{nom}	in.	1-5/8	2-1/2	1-5/8	2-1/2	3-1/4	2-1/4	3	4-1/4	3-1/4	5	4	6-1/4
Minimum effective embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum hole depth	h_o	in.	2	2-7/8	1-7/8	2-3/4	3-1/2	2-5/8	3-3/8	4-5/8	3-5/8	5-3/8	4-4/8	6-5/8
Fixture hole diameter	d_h	in.	3/8		1/2			5/8			3/4		7/8	
Anchor Length = h_{nom} + t	ℓ		See ordering information											
Installation torque concrete	T_{inst}	ft-lb (Nm)	18 (24)		19 (26)	40 (54)		45 (61)			85 (115)		115 (155)	
Maximum impact wrench torque rating concrete[2]	$T_{impact,max}$	ft-lb (Nm)	114 (154)	137 (185)	114 (154)	450 (608)		137 (185)	450 (608)		450 (608)		450 (608)	
Installation torque masonry	T_{inst}	ft-lb (Nm)	21 (28)		22 (30)			34 (46)			38 (52)		70 (95)	
Maximum impact wrench torque rating masonry[2,3]	$T_{impact,max}$	ft-lb (Nm)	114 (155)		114 (155)		332 (450)	332 (450)			332 (450)		332 (450)	
Wrench size		in.	7/16		9/16			3/4			15/16		1-1/8	

1 T_{inst} is the maximum installation torque that may be applied with a torque wrench.

2 Because of variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over torquing can damage the anchor and/or reduce its holding capacity.

3 For more information on KWIK HUS-EZ installed in masonry, see ESR-3056 and section 3.3.6.3.3.

Figure 1 - Hilti KWIK HUS-EZ specifications



KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 2 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in uncracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)	f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)
1/4	1-5/8 (41)	585 (2.6)	620 (2.8)	675 (3.0)	765 (3.4)	1,075 (4.8)	1,180 (5.2)	1,360 (6.0)	1,670 (7.4)
	2-1/2 (64)	1,525 (6.8)	1,670 (7.4)	1,930 (8.6)	2,365 (10.5)	2,235 (9.9)	2,450 (10.9)	2,825 (12.6)	3,460 (15.4)
3/8	1-5/8 (41)	910 (4.0)	1,000 (4.4)	1,155 (5.1)	1,415 (6.3)	980 (4.4)	1,075 (4.8)	1,245 (5.5)	1,520 (6.8)
	2-1/2 (64)	1,980 (8.8)	2,165 (9.6)	2,505 (11.1)	3,065 (13.6)	2,130 (9.5)	2,335 (10.4)	2,695 (12.0)	3,300 (14.7)
	3-1/4 (83)	3,085 (13.7)	3,375 (15.0)	3,900 (17.3)	4,775 (21.2)	6,640 (29.5)	7,275 (32.4)	8,400 (37.4)	10,290 (45.8)
1/2	2-1/4 (57)	1,645 (7.3)	1,800 (8.0)	2,080 (9.3)	2,550 (11.3)	1,770 (7.9)	1,940 (8.6)	2,240 (10.0)	2,745 (12.2)
	3 (76)	2,785 (12.4)	3,050 (13.6)	3,525 (15.7)	4,315 (19.2)	3,000 (13.3)	3,285 (14.6)	3,795 (16.9)	4,645 (20.7)
	4-1/4 (108)	5,070 (22.6)	5,555 (24.7)	6,415 (28.5)	7,855 (34.9)	10,920 (48.6)	11,965 (53.2)	13,815 (61.5)	16,920 (75.3)
5/8	3-1/4 (83)	3,240 (14.4)	3,550 (15.8)	4,100 (18.2)	5,025 (22.4)	3,490 (15.5)	3,825 (17.0)	4,415 (19.6)	5,410 (24.1)
	5 (127)	6,705 (29.8)	7,345 (32.7)	8,485 (37.7)	10,390 (46.2)	14,445 (64.3)	15,825 (70.4)	18,270 (81.3)	22,380 (99.6)
3/4	4 (102)	4,380 (19.5)	4,795 (21.3)	5,540 (24.6)	6,785 (30.2)	9,430 (41.9)	10,330 (45.9)	11,930 (53.1)	14,610 (65.0)
	6-1/4 (159)	9,345 (41.6)	10,235 (45.5)	11,820 (52.6)	14,475 (64.4)	20,125 (89.5)	22,045 (98.1)	25,455 (113.2)	31,175 (138.7)

3.3.6

Table 3 - Hilti KWIK HUS-EZ design strength with concrete/pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)	f'_c = 2,500 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 6,000 psi lb (kN)
1/4	1-5/8 (41)	300 (1.3)	315 (1.4)	345 (1.5)	390 (1.7)	765 (3.4)	835 (3.7)	965 (4.3)	1,180 (5.2)
	2-1/2 (64)	760 (3.4)	830 (3.7)	960 (4.3)	1,175 (5.2)	1,585 (7.1)	1,735 (7.7)	2,000 (8.9)	2,450 (10.9)
3/8	1-5/8 (41)	475 (2.1)	520 (2.3)	600 (2.7)	730 (3.2)	695 (3.1)	760 (3.4)	880 (3.9)	1,080 (4.8)
	2-1/2 (64)	1,400 (6.2)	1,535 (6.8)	1,775 (7.9)	2,170 (9.7)	1,510 (6.7)	1,655 (7.4)	1,910 (8.5)	2,340 (10.4)
	3-1/4 (83)	2,185 (9.7)	2,390 (10.6)	2,765 (12.3)	3,385 (15.1)	4,705 (20.9)	5,155 (22.9)	5,950 (26.5)	7,285 (32.4)
1/2	2-1/4 (57)	1,035 (4.6)	1,135 (5.0)	1,310 (5.8)	1,605 (7.1)	1,115 (5.0)	1,220 (5.4)	1,410 (6.3)	1,725 (7.7)
	3 (76)	1,755 (7.8)	1,920 (8.5)	2,220 (9.9)	2,715 (12.1)	1,890 (8.4)	2,070 (9.2)	2,390 (10.6)	2,925 (13.0)
	4-1/4 (108)	3,190 (14.2)	3,495 (15.5)	4,040 (18.0)	4,945 (22.0)	6,875 (30.6)	7,530 (33.5)	8,695 (38.7)	10,650 (47.4)
5/8	3-1/4 (83)	2,040 (9.1)	2,235 (9.9)	2,580 (11.5)	3,165 (14.1)	2,200 (9.8)	2,410 (10.7)	2,780 (12.4)	3,405 (15.1)
	5 (127)	4,225 (18.8)	4,625 (20.6)	5,340 (23.8)	6,540 (29.1)	9,095 (40.5)	9,965 (44.3)	11,505 (51.2)	14,090 (62.7)
3/4	4 (102)	2,755 (12.3)	3,020 (13.4)	3,485 (15.5)	4,270 (19.0)	5,940 (26.4)	6,505 (28.9)	7,510 (33.4)	9,200 (40.9)
	6-1/4 (159)	5,885 (26.2)	6,445 (28.7)	7,440 (33.1)	9,115 (40.5)	12,670 (56.4)	13,880 (61.7)	16,030 (71.3)	19,630 (87.3)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in table 6 to 15 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - α_{seis} = 0.60
All other sizes - α_{seis} = 0.75
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

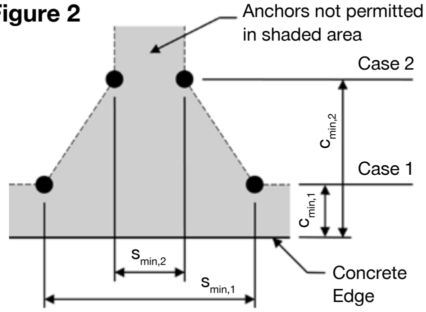
3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 4 - Steel design strength for Hilti KWIK HUS-EZ anchors[1,2]

Nominal anchor diameter in.	Nominal embedment in. (mm)			Tensile ϕN_{sa} [3] lb (kN)	Shear ϕV_{sa} [4] lb (kN)	Seismic shear $\phi V_{sa,eq}$ [5] lb (kN)
1/4	1-5/8 (41)	2-1/2 (64)		3,945 (17.5)	930 (4.1)	835 (3.7)
3/8	1-5/8 (41)			5,980 (26.6)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	3-1/4 (83)		6,720 (29.9)	3,110 (13.8)	1,865 (8.3)
1/2	2-1/4 (57)	3 (76)	4-1/4 (108)	11,780 (52.4)	5,545 (24.7)	3,330 (14.8)
5/8	3-1/4 (83)	5 (127)		15,735 (70.0)	6,735 (30.0)	4,040 (18.0)
3/4	4 (102)	6-1/4 (159)		20,810 (92.6)	9,995 (44.5)	6,935 (30.8)

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 KWIK HUS-EZ anchors are to be considered brittle steel elements.
3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17.
4 Shear values determined by static shear tests with $\phi V_{sa} < \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17.
5 Seismic shear values determined by seismic shear tests with $\phi V_{sa,eq} < \phi\ 0.60 A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17. See section 3.1.8.7 for additional information on seismic applications.

Figure 2



For a specific edge distance, the permitted spacing is calculated as follows:

$$s \geq s_{min,2} + \frac{(s_{min,1} - s_{min,2})}{(c_{min,1} - c_{min,2})}\ (c - c_{min,2})$$

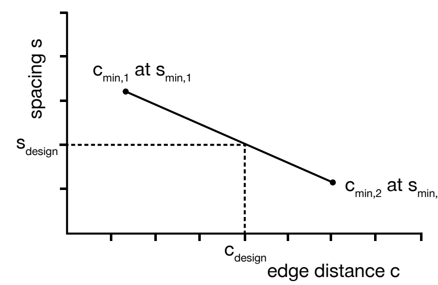


Table 5 - Hilti KWIK HUS-EZ specifications

Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Effective minimum embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum member thickness	h_{min}	in.	3-1/4	4.125	3-1/4	4	4-7/8	4-1/2	4 3/4	6-3/4	5	7	6	8-1/8
Case 1	$c_{min,1}$	in.	1.50					1.75						
	for $s_{min,1} \geq$	in.	3								4			
Case 2	$c_{min,2}$	in.	2	2.78	2.63	2.92	3.75	2.75	3.75	5.25	3.63	5.81	4.41	7.28
	for $s_{min,2} \geq$	in.	1.50		2.25			3						

1 Linear interpolation is permitted to establish an edge distance and spacing combination between Case 1 and Case 2. Linear interpolation for a specific edge .distance c, where $c_{min,1} < c < c_{min,2}$ will determine the permissible spacings.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 6 - Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

1/4-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-1/2	(38)	0.71	0.63	0.78	0.65	0.59	0.56	0.40	0.21	0.78	0.42	n/a	n/a
2	(51)	0.78	0.67	1.00	0.77	0.62	0.58	0.61	0.33	1.00	0.65	n/a	n/a
2-1/2	(64)	0.85	0.72		0.90	0.65	0.60	0.86	0.46		0.90	n/a	n/a
3	(76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
3-1/4	(83)	0.96	0.78			0.70	0.63		0.68			0.88	n/a
3-1/2	(89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
4	(102)	1.00	0.85			0.74	0.66		0.92			0.98	n/a
4-1/8	(105)		0.86			0.75	0.66		0.97			1.00	0.81
4-1/2	(114)		0.89			0.77	0.68		1.00				0.84
5	(127)		0.93			0.80	0.70						0.89
5-1/2	(140)		0.98			0.83	0.72						0.93
6	(152)		1.00			0.86	0.74						0.97
7	(178)					0.92	0.78						1.00
8	(203)					0.98	0.82						
9	(229)					1.00	0.86						
10	(254)						0.89						
11	(279)						0.93						
12	(305)						0.97						
14	(356)						1.00						

3.3.6

Table 7 - Load adjustment factors for 1/4-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

1/4-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-1/2	(38)	0.71	0.63	0.88	0.65	0.59	0.56	0.40	0.21	0.80	0.43	n/a	n/a
2	(51)	0.78	0.67	1.00	0.77	0.62	0.58	0.62	0.33	1.00	0.66	n/a	n/a
2-1/2	(64)	0.85	0.72		0.90	0.65	0.60	0.87	0.46		0.90	n/a	n/a
3	(76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
3-1/4	(83)	0.96	0.78			0.70	0.63		0.68			0.89	n/a
3-1/2	(89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
4	(102)	1.00	0.85			0.74	0.66		0.93			0.98	n/a
4-1/8	(105)		0.86			0.75	0.66		0.97			1.00	0.81
4-1/2	(114)		0.89			0.77	0.68		1.00				0.85
5	(127)		0.93			0.80	0.70						0.89
5-1/2	(140)		0.98			0.83	0.72						0.93
6	(152)		1.00			0.86	0.74						0.98
7	(178)					0.92	0.78						1.00
8	(203)					0.98	0.82						
9	(229)					1.00	0.86						
10	(254)						0.90						
11	(279)						0.94						
12	(305)						0.98						
14	(356)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 8 - Load adjustment factors for 3/8-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

3/8-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	(mm)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	n/a	n/a	n/a	0.58	0.63	0.57	n/a	n/a	n/a	0.49	0.25	0.08	0.58	0.50	0.17	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	0.76	0.75	0.66	n/a	n/a	n/a	0.75	0.38	0.13	0.76	0.75	0.26	n/a	n/a	n/a
	2-1/4	(57)	0.84	0.70	0.65	0.86	0.81	0.70	0.65	0.60	0.55	0.90	0.46	0.16	0.90	0.81	0.31	n/a	n/a	n/a
	2-1/2	(64)	0.88	0.72	0.67	0.95	0.88	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.88	0.37	n/a	n/a	n/a
	3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
	3-1/4	(83)	0.99	0.79	0.72			0.90	0.72	0.64	0.57		0.80	0.27			0.54	0.95	n/a	n/a
	3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.89	0.30			0.61	0.98	n/a	n/a
	4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.74	1.00	0.84	n/a
	4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.88		0.89	n/a
	4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.96		0.91	0.64
	5	(127)		0.95	0.83				0.84	0.72	0.61			0.52			1.00		0.94	0.66
	6	(152)		1.00	0.90				0.91	0.76	0.63			0.68					1.00	0.72
	7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
	8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
	9	(229)								0.90	0.69									0.88
	10	(254)								0.94	0.71									0.93
	11	(279)								0.98	0.74									0.97
	12	(305)								1.00	0.76									1.00
	14	(356)									0.80									
	16	(406)									0.84									
	18	(457)									0.89									
	20	(508)									0.93									
	24	(610)									1.00									

Table 9 - Load adjustment factors for 3/8-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

3/8-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear: ⊥ toward edge f_{RV}			Edge distance in shear: II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	(mm)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2	(38)	n/a	n/a	n/a	0.92	0.66	0.57	n/a	n/a	n/a	0.49	0.25	0.09	0.92	0.50	0.17	n/a	n/a	n/a
	2	(51)	n/a	n/a	n/a	1.00	0.79	0.66	n/a	n/a	n/a	0.76	0.39	0.13	1.00	0.77	0.26	n/a	n/a	n/a
	2-1/4	(57)	0.84	0.70	0.65	1.00	0.85	0.70	0.66	0.60	0.55	0.90	0.46	0.16	1.00	0.85	0.31	n/a	n/a	n/a
	2-1/2	(64)	0.88	0.72	0.67	1.00	0.92	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.92	0.37	n/a	n/a	n/a
	3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
	3-1/4	(83)	0.99	0.79	0.72			0.90	0.73	0.64	0.57		0.80	0.27			0.55	0.95	n/a	n/a
	3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.90	0.31			0.61	0.98	n/a	n/a
	4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.75	1.00	0.84	n/a
	4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.89		0.89	n/a
	4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.97		0.92	0.64
	5	(127)		0.95	0.83				0.85	0.72	0.61			0.52			1.00		0.94	0.66
	6	(152)		1.00	0.90				0.92	0.77	0.63			0.69					1.00	0.72
	7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
	8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
	9	(229)								0.90	0.69									0.88
	10	(254)								0.94	0.72									0.93
	11	(279)								0.99	0.74									0.97
	12	(305)								1.00	0.76									1.00
	14	(356)									0.80									
	16	(406)									0.85									
	18	(457)									0.89									
	20	(508)									0.93									
	24	(610)									1.00									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

Table 10 - Load adjustment factors for 1/2-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

1/2-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in. (mm)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)
Spacing (s)/edge distance (c_{ai})/concrete thickness (h) - in. (mm)	1-3/4 (44)	n/a	n/a	n/a	0.68	0.57	0.51	n/a	n/a	n/a	0.40	0.25	0.07	0.68	0.50	0.15	n/a	n/a	n/a
	2 (51)	n/a	n/a	n/a	0.75	0.62	0.54	n/a	n/a	n/a	0.48	0.31	0.09	0.75	0.61	0.18	n/a	n/a	n/a
	2-1/2 (64)	n/a	n/a	n/a	0.91	0.71	0.60	n/a	n/a	n/a	0.68	0.43	0.13	0.91	0.71	0.25	n/a	n/a	n/a
	3 (76)	0.83	0.73	0.66	1.00	0.81	0.66	0.65	0.61	0.55	0.89	0.56	0.17	1.00	0.81	0.33	n/a	n/a	n/a
	3-1/2 (89)	0.88	0.77	0.68		0.93	0.73	0.68	0.63	0.56	1.00	0.71	0.21		0.93	0.42	n/a	n/a	n/a
	4 (102)	0.94	0.81	0.71		1.00	0.80	0.71	0.65	0.57		0.87	0.26		1.00	0.52	n/a	n/a	n/a
	4-1/2 (114)	0.99	0.85	0.73			0.87	0.73	0.67	0.58		1.00	0.31			0.62	0.96	n/a	n/a
	4-3/4 (121)	1.00	0.87	0.75			0.91	0.74	0.68	0.58			0.33			0.67	0.99	0.85	n/a
	5 (127)		0.89	0.76			0.95	0.76	0.69	0.58			0.36			0.72	1.00	0.87	n/a
	6 (152)		0.96	0.81			1.00	0.81	0.73	0.60			0.47			0.95		0.95	n/a
	6-3/4 (171)		1.00	0.85				0.85	0.76	0.61			0.57			1.00		1.00	0.68
	7 (178)			0.86				0.86	0.77	0.62			0.60						0.69
	8 (203)			0.91				0.91	0.80	0.64			0.73						0.73
	9 (229)			0.97				0.96	0.84	0.65			0.87						0.78
	10 (254)			1.00				1.00	0.88	0.67			1.00						0.82
	11 (279)								0.92	0.69									0.86
	12 (305)								0.95	0.70									0.90
	14 (356)								1.00	0.74									0.97
	16 (406)									0.77									1.00
	18 (457)									0.80									
	20 (508)									0.84									
	> 24 (610)									0.91									

3.3.6

Table 11 - Load adjustment factors for 1/2-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

1/2-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to and away from edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in. (mm)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)
Spacing (s)/edge distance (c_{ai})/concrete thickness (h) - in. (mm)	1-3/4 (44)	n/a	n/a	n/a	0.82	0.66	0.55	n/a	n/a	n/a	0.45	0.28	0.08	0.82	0.57	0.17	n/a	n/a	n/a
	2 (51)	n/a	n/a	n/a	0.90	0.72	0.58	n/a	n/a	n/a	0.55	0.35	0.10	0.90	0.70	0.21	n/a	n/a	n/a
	2-1/2 (64)	n/a	n/a	n/a	1.00	0.83	0.65	n/a	n/a	n/a	0.77	0.49	0.14	1.00	0.83	0.29	n/a	n/a	n/a
	3 (76)	0.83	0.73	0.66	1.00	0.94	0.72	0.67	0.62	0.56	1.00	0.64	0.19	1.00	0.94	0.38	n/a	n/a	n/a
	3-1/2 (89)	0.88	0.77	0.68		1.00	0.79	0.70	0.64	0.56		0.80	0.24		1.00	0.48	n/a	n/a	n/a
	4 (102)	0.94	0.81	0.71		1.00	0.87	0.72	0.66	0.57		0.98	0.29		1.00	0.59	n/a	n/a	n/a
	4-1/2 (114)	0.99	0.85	0.73			0.95	0.75	0.69	0.58		1.00	0.35			0.70	1.00	n/a	n/a
	4-3/4 (121)	1.00	0.87	0.75			0.99	0.77	0.70	0.59			0.38			0.76		0.88	n/a
	5 (127)		0.89	0.76			1.00	0.78	0.71	0.59			0.41			0.82		0.91	n/a
	6 (152)		0.96	0.81			1.00	0.84	0.75	0.61			0.54			1.00		0.99	n/a
	6-3/4 (171)		1.00	0.85				0.88	0.78	0.62			0.64					1.00	0.70
	7 (178)			0.86				0.89	0.79	0.63			0.68						0.72
	8 (203)			0.91				0.95	0.83	0.65			0.83						0.77
	9 (229)			0.97				1.00	0.87	0.67			0.99						0.81
	10 (254)			1.00					0.91	0.68			1.00						0.86
	11 (279)								0.95	0.70									0.90
	12 (305)								0.99	0.72									0.94
	14 (356)								1.00	0.76									1.00
	16 (406)									0.79									
	18 (457)									0.83									
	20 (508)									0.87									
	> 24 (610)									0.94									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 12 - Load adjustment factors for 5/8-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

5/8-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	0.62	0.51	n/a	n/a	0.24	0.06	0.47	0.13	n/a	n/a
2	(51)	n/a	n/a	0.67	0.54	n/a	n/a	0.29	0.08	0.57	0.15	n/a	n/a
2-1/2	(64)	n/a	n/a	0.76	0.59	n/a	n/a	0.40	0.11	0.76	0.21	n/a	n/a
3	(76)	0.71	0.63	0.86	0.65	0.61	0.55	0.53	0.14	0.86	0.28	n/a	n/a
3-1/2	(89)	0.74	0.65	0.97	0.70	0.63	0.55	0.66	0.18	0.97	0.35	n/a	n/a
4	(102)	0.78	0.67	1.00	0.76	0.65	0.56	0.81	0.22	1.00	0.43	n/a	n/a
4-1/2	(114)	0.81	0.69		0.83	0.66	0.57	0.97	0.26		0.52	n/a	n/a
5	(127)	0.85	0.71		0.89	0.68	0.58	1.00	0.30		0.60	0.85	n/a
5-1/2	(140)	0.88	0.74		0.96	0.70	0.58		0.35		0.70	0.89	n/a
6	(152)	0.92	0.76		1.00	0.72	0.59		0.40		0.80	0.93	n/a
7	(178)	0.99	0.80			0.75	0.61		0.50		1.00	1.00	0.65
8	(203)	1.00	0.84			0.79	0.62		0.61				0.69
9	(229)		0.89			0.83	0.64		0.73				0.74
10	(254)		0.93			0.86	0.65		0.86				0.78
11	(279)		0.97			0.90	0.67		0.99				0.81
12	(305)		1.00			0.94	0.68		1.00				0.85
14	(356)					1.00	0.71						0.92
16	(406)						0.74						0.98
18	(457)						0.77						1.00
20	(508)						0.80						
24	(610)						0.86						
> 30	(762)						0.95						

Table 13 - Load adjustment factors for 5/8-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

5/8-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	0.63	0.51	n/a	n/a	0.27	0.07	0.53	0.14	n/a	n/a
2	(51)	n/a	n/a	0.68	0.54	n/a	n/a	0.33	0.09	0.65	0.17	n/a	n/a
2-1/2	(64)	n/a	n/a	0.77	0.59	n/a	n/a	0.46	0.12	0.77	0.24	n/a	n/a
3	(76)	0.71	0.63	0.87	0.65	0.62	0.55	0.60	0.16	0.87	0.32	n/a	n/a
3-1/2	(89)	0.74	0.65	0.98	0.70	0.64	0.56	0.75	0.20	0.98	0.40	n/a	n/a
4	(102)	0.78	0.67	1.00	0.76	0.66	0.57	0.92	0.25	1.00	0.49	n/a	n/a
4-1/2	(114)	0.81	0.69		0.83	0.68	0.57	1.00	0.29		0.59	n/a	n/a
5	(127)	0.85	0.71		0.89	0.70	0.58		0.34		0.69	0.89	n/a
5-1/2	(140)	0.88	0.74		0.96	0.72	0.59		0.40		0.79	0.93	n/a
6	(152)	0.92	0.76		1.00	0.74	0.60		0.45		0.90	0.97	n/a
7	(178)	0.99	0.80			0.78	0.61		0.57		1.00	1.00	0.68
8	(203)	1.00	0.84			0.82	0.63		0.69				0.72
9	(229)		0.89			0.86	0.65		0.83				0.77
10	(254)		0.93			0.89	0.66		0.97				0.81
11	(279)		0.97			0.93	0.68		1.00				0.85
12	(305)		1.00			0.97	0.70						0.89
14	(356)					1.00	0.73						0.96
16	(406)						0.76						1.00
18	(457)						0.79						
20	(508)						0.83						
24	(610)						0.89						
> 30	(762)						0.99						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 14 - Load adjustment factors for 3/4-in. diameter Hilti KWIK HUS-EZ in uncracked concrete[1,2]

3/4-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}		in. (mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.10	0.05	0.19	0.10	n/a	n/a
	2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.12	0.06	0.23	0.12	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.16	0.08	0.33	0.17	n/a	n/a
	3	(76)	0.67	0.60	0.76	0.58	0.56	0.54	0.21	0.11	0.43	0.22	n/a	n/a
	3-1/2	(89)	0.70	0.62	0.84	0.62	0.57	0.55	0.27	0.14	0.54	0.28	n/a	n/a
	4	(102)	0.73	0.64	0.93	0.67	0.58	0.55	0.33	0.17	0.66	0.34	n/a	n/a
	4-1/2	(114)	0.76	0.65	1.00	0.72	0.59	0.56	0.39	0.20	0.79	0.41	n/a	n/a
	5	(127)	0.79	0.67		0.76	0.60	0.56	0.46	0.24	0.92	0.48	n/a	n/a
	5-1/2	(140)	0.81	0.69		0.81	0.61	0.57	0.53	0.28	1.00	0.55	n/a	n/a
	6	(152)	0.84	0.71		0.86	0.62	0.58	0.61	0.31		0.63	0.69	n/a
	7	(178)	0.90	0.74		0.97	0.64	0.59	0.77	0.40		0.79	0.75	n/a
	8	(203)	0.96	0.78		1.00	0.66	0.60	0.94	0.48		0.97	0.80	n/a
	8-1/8	(206)	0.96	0.78			0.66	0.60	0.96	0.50		0.99	0.80	0.65
	9	(229)	1.00	0.81			0.68	0.62	1.00	0.58		1.00	0.85	0.68
	10	(254)		0.84			0.70	0.63		0.68			0.89	0.72
	11	(279)		0.88			0.72	0.64		0.78			0.94	0.75
	12	(305)		0.91			0.74	0.65		0.89			0.98	0.79
	14	(356)		0.98			0.78	0.68		1.00			1.00	0.85
	16	(406)		1.00			0.82	0.71						0.91
	18	(457)					0.86	0.73						0.96
	20	(508)					0.90	0.76						1.00
	24	(610)					0.98	0.81						
	30	(762)					1.00	0.89						
	> 36	(914)						0.96						

3.3.6

Table 15 - Load adjustment factors for 3/4-in. diameter Hilti KWIK HUS-EZ in cracked concrete[1,2]

3/4-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}		in. (mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.11	0.06	0.22	0.11	n/a	n/a
	2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.13	0.07	0.27	0.14	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.19	0.10	0.37	0.19	n/a	n/a
	3	(76)	0.67	0.60	0.76	0.58	0.57	0.54	0.24	0.13	0.49	0.25	n/a	n/a
	3-1/2	(89)	0.70	0.62	0.85	0.63	0.58	0.55	0.31	0.16	0.61	0.32	n/a	n/a
	4	(102)	0.73	0.64	0.93	0.67	0.59	0.56	0.38	0.19	0.75	0.39	n/a	n/a
	4-1/2	(114)	0.76	0.65	1.00	0.72	0.60	0.56	0.45	0.23	0.90	0.46	n/a	n/a
	5	(127)	0.79	0.67		0.77	0.61	0.57	0.52	0.27	1.00	0.54	n/a	n/a
	5-1/2	(140)	0.81	0.69		0.81	0.62	0.58	0.60	0.31		0.63	n/a	n/a
	6	(152)	0.84	0.71		0.87	0.63	0.58	0.69	0.36		0.71	0.72	n/a
	7	(178)	0.90	0.74		0.97	0.65	0.60	0.87	0.45		0.90	0.78	n/a
	8	(203)	0.96	0.78		1.00	0.67	0.61	1.00	0.55		1.00	0.83	n/a
	8-1/8	(206)	0.96	0.78			0.68	0.61		0.56			0.84	0.67
	9	(229)	1.00	0.81			0.70	0.63		0.66			0.88	0.71
	10	(254)		0.84			0.72	0.64		0.77			0.93	0.75
	11	(279)		0.88			0.74	0.65		0.89			0.98	0.78
	12	(305)		0.91			0.76	0.67		1.00			1.00	0.82
	14	(356)		0.98			0.80	0.70						0.89
	16	(406)		1.00			0.85	0.72						0.95
	18	(457)					0.89	0.75						1.00
	20	(508)					0.93	0.78						
	24	(610)					1.00	0.84						
	30	(762)						0.92						
	> 36	(914)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 16 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

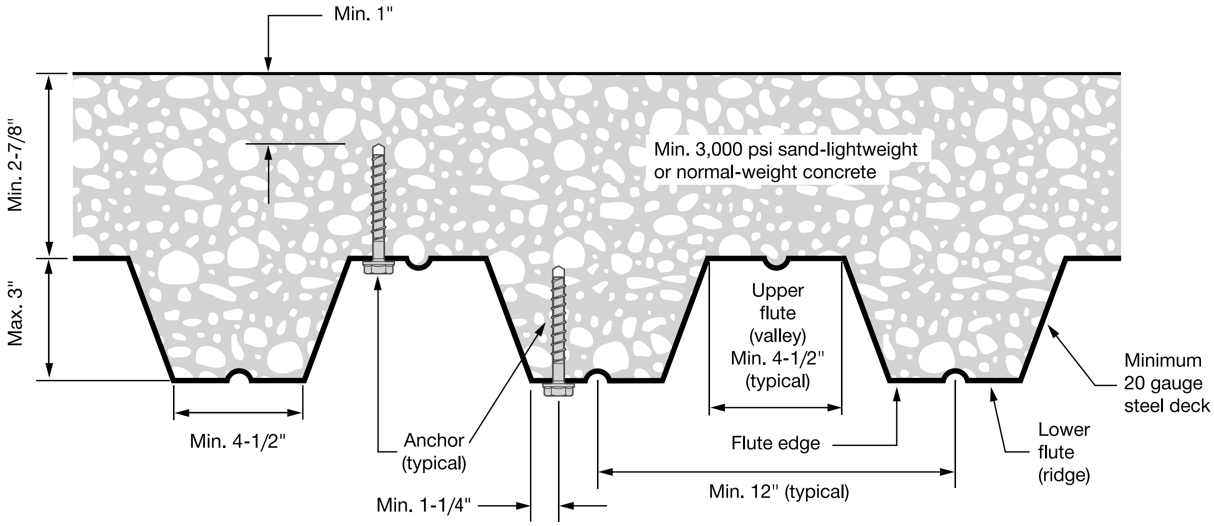
Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)
1/4	1-5/8 (41)	545 (2.4)	595 (2.6)	725 (3.2)	725 (3.2)	670 (3.0)	730 (3.2)	725 (3.2)	725 (3.2)
	2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	1,325 (5.9)	1,325 (5.9)	1,275 (5.7)	1,470 (6.5)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	845 (3.8)	975 (4.3)	905 (4.0)	905 (4.0)	970 (4.3)	1,120 (5.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,455 (6.5)	1,680 (7.5)	905 (4.0)	905 (4.0)	1,900 (8.5)	2,195 (9.8)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	2,550 (11.3)	2,945 (13.1)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	850 (3.8)	980 (4.4)	965 (4.3)	965 (4.3)	905 (4.0)	1,045 (4.6)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,990 (8.9)	2,300 (10.2)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,485 (15.5)	4,025 (17.9)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,715 (12.1)	3,135 (13.9)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	6,170 (27.4)	7,125 (31.7)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,715 (12.1)	3,135 (13.9)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

Table 17 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n [7]		Shear - ϕV_n [7,8]		Tension - ϕN_n [7]		Shear - ϕV_n [7,8]	
		f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)	f'_c = 3,000 psi lb (kN)	f'_c = 4,000 psi lb (kN)
1/4	1-5/8 (41)	280 (1.2)	305 (1.4)	725 (3.2)	725 (3.2)	340 (1.5)	370 (1.6)	725 (3.2)	725 (3.2)
	2-1/2 (64)	605 (2.7)	700 (3.1)	1,325 (5.9)	1,325 (5.9)	635 (2.8)	735 (3.3)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	525 (2.3)	605 (2.7)	905 (4.0)	905 (4.0)	770 (3.4)	890 (4.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,035 (4.6)	1,195 (5.3)	905 (4.0)	905 (4.0)	1,345 (6.0)	1,555 (6.9)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	1,805 (8.0)	2,085 (9.3)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	535 (2.4)	620 (2.8)	965 (4.3)	965 (4.3)	640 (2.8)	740 (3.3)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,255 (5.6)	1,450 (6.4)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	2,195 (9.8)	2,535 (11.3)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	1,710 (7.6)	1,975 (8.8)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	3,885 (17.3)	4,485 (20.0)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,710 (7.6)	1,975 (8.8)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

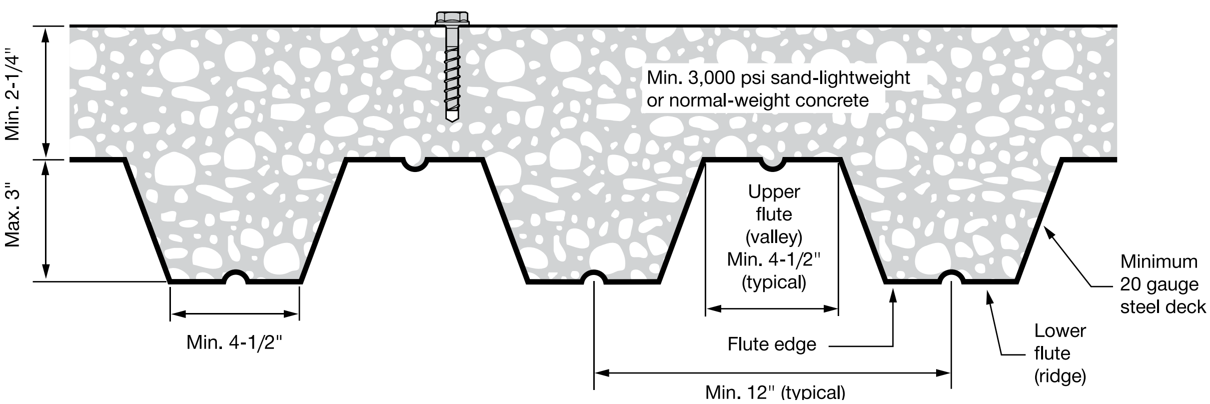
1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x h_{nom} (nominal embedment).
4 Tabular values are lightweight concrete and no additional reduction factor is needed.
5 No additional reduction factors for spacing or edge distance need to be applied.
6 Comparison to steel values in table 4 is not required. Values in tables 16 and 17 control.
7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension only by $\alpha_{N,seis}$ = 0.75.
See section 3.1.8.7 for additional information on seismic applications.
8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

Figure 3 – Installation of Hilti KWIK HUS-EZ (KH-EZ) in soffit of concrete over steel deck floor and roof assemblies[1]



1 Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum concrete cover above the drilled hole is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

Figure 4 – Installation of Hilti KWIK HUS-EZ on the top of sand-lightweight concrete over metal floor and roof assemblies



3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 18 - Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	620 (2.8)	675 (3.0)	1,180 (5.2)	1,360 (6.0)
3/8	1-5/8 (41)	1,000 (4.4)	1,155 (5.1)	1,075 (4.8)	1,245 (5.5)

Table 19 - Hilti KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	315 (1.4)	345 (1.5)	835 (3.7)	965 (4.3)
3/8	1-5/8 (41)	520 (2.3)	600 (2.7)	760 (3.4)	880 (3.9)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λa as follows:
for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

Table 20 - Load adjustment factors for Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a	in. (mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}	in. (mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	0.44	0.58	n/a	n/a	0.44	0.58	0.44	0.58	n/a	n/a
2	(51)	n/a	n/a	0.50	0.67	n/a	n/a	0.50	0.67	0.50	0.67	n/a	n/a
2-1/2	(64)	n/a	n/a	0.63	0.83	n/a	n/a	0.63	0.83	0.63	0.83	0.78	0.83
3	(76)	0.92	0.95	0.75	1.00	0.68	0.71	0.75	1.00	0.75	1.00	0.85	0.91
3-1/4	(83)	0.96	0.99	0.81		0.70	0.72	0.81		0.81			
3-1/2	(89)	0.99	1.00	0.88		0.71	0.74	0.88		0.88			
4	(102)	1.00		1.00		0.74	0.78	1.00		1.00			
4-1/2	(114)					0.77	0.81						
5	(127)					0.80	0.84						
5-1/2	(140)					0.83	0.88						
6	(152)					0.86	0.91						
6-1/2	(165)					0.89	0.95						
7	(178)					0.92	0.98						
7-1/2	(191)					0.95	1.00						
8	(203)					0.98							
9	(229)					1.00							

Table 21 - Load adjustment factors for Hilti KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear: ⊥ toward edge f_{RV}		Edge distance in shear: II to and away from edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a	in. (mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}	in. (mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	0.99	1.00	n/a	n/a	0.51	0.62	0.99	1.00	n/a	n/a
2	(51)	n/a	n/a	1.00		n/a	n/a	0.62	0.76	1.00		n/a	n/a
2-1/2	(64)	n/a	n/a			n/a	n/a	0.87	1.00			0.78	0.83
3	(76)	0.92	0.95			0.68	0.71	1.00				0.85	0.91
3-1/4	(83)	0.96	0.99			0.70	0.73						
3-1/2	(89)	0.99	1.00			0.71	0.74						
4	(102)	1.00				0.74	0.78						
4-1/2	(114)					0.77	0.81						
5	(127)					0.80	0.85						
5-1/2	(140)					0.83	0.88						
6	(152)					0.86	0.92						
6-1/2	(165)					0.89	0.95						
7	(178)					0.92	0.98						
7-1/2	(191)					0.95	1.00						
8	(203)					0.98							
9	(229)					1.00							

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

(shaded cell) - For concrete thickness greater than or equal to 3-1/4-inches, the anchor can be designed using either table 2 or table 3 of this section.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

3.3.6.3.2 Canadian Limit State design

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-3027. These tables are followed by factored resistance tables. The factored resitance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-14 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.com.

Table 22 - Steel resistance for Hilti KWIK HUS-EZ carbon steel screw anchor[1,2]

<table>
<tr><th>Nominal anchor diameter in.</th><th colspan="6">Nominal embedment in. (mm)</th><th>Tensile N_{sar}[3] lb (kN)</th><th>Shear V_{sar}[4] lb (kN)</th><th>Seismic shear $V_{sar,eq}$[5] lb (kN)</th></tr>
<tr><td>1/4</td><td colspan="3">1-5/8 (41)</td><td colspan="3">2-1/2 (64)</td><td>3,370 (15.0)</td><td>855 (3.8)</td><td>770 (3.4)</td></tr>
<tr><td rowspan="2">3/8</td><td colspan="6">1-5/8 (41)</td><td>5,475 (24.4)</td><td>2,025 (9.0)</td><td>2,025 (9.0)</td></tr>
<tr><td colspan="3">2-1/2 (64)</td><td colspan="3">3-1/4 (83)</td><td>6,150 (27.4)</td><td>2,865 (12.7)</td><td>1,720 (7.7)</td></tr>
<tr><td>1/2</td><td colspan="2">2-1/4 (57)</td><td colspan="2">3 (76)</td><td colspan="2">4-1/4 (108)</td><td>10,780 (48.0)</td><td>5,110 (22.7)</td><td>3,065 (13.6)</td></tr>
<tr><td>5/8</td><td colspan="3">3-1/4 (83)</td><td colspan="3">5 (127)</td><td>14,405 (64.1)</td><td>6,200 (27.6)</td><td>3,720 (16.5)</td></tr>
<tr><td>3/4</td><td colspan="3">4 (102)</td><td colspan="3">6-1/4 (159)</td><td>19,050 (84.7)</td><td>9,205 (40.9)</td><td>6,385 (28.4)</td></tr>
</table>

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Hilti KWIK HUS-EZ carbon steel screw anchors are to be considered brittle steel elements.
3 Tensile $N_{sar} = A_{se,N}\ \phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Annex D.
4 Shear determined by static shear tests with $V_{sar} < A_{se,V}\ \phi_s\ 0.6\ f_{uta}$ R as noted in CSA A23.3-14 Annex D.
5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} < A_{se,V}\ \phi_s\ 0.6\ f_{uta}$ R as noted in CSA A23.3-14 Annex D. See section 3.1.8.7 for additional information on seismic applications.

Table 23 - Hilti KWIK HUS-EZ design information in accordance with CSA A23.3-14 Annex D[1]

Design parameter	Symbol	Units	Nominal anchor diameter												Ref
			1/4		3/8			1/2			5/8		3/4		A23.3-14
Nominal anchor diameter	d_a	in. (mm)	0.25 (6.4)		0.375 (9.5)			0.5 (12.7)			0.625 (15.9)		0.75 (19.1)		
Effective embedment[2]	h_{ef}	in. (mm)	1.18 (30)	1.92 (49)	1.11 (28)	1.86 (47)	2.50 (64)	1.52 (39)	2.16 (55)	3.22 (82)	2.39 (61)	3.88 (99)	2.92 (74)	4.84 (123)	
Min. nominal embedment[2]	h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	2-1/4 (57)	3 (76)	4-1/4 (108)	3-1/4 (83)	5 (127)	4 (102)	6-1/4 (159)	
Minimum concrete thickness[3]	h_{min}	in. (mm)	3-1/4 (83)	4-1/8 (105)	3-1/4 (83)	4 (102)	4-3/4 (121)	4-1/2 (114)	4-3/4 (121)	6-3/4 (171)	5 (127)	7 (178)	6 (152)	8-1/8 (206)	
Critical edge distance	c_{ac}	in. (mm)	2 (51)	2.78 (71)	2.63 (67)	2.92 (74)	3.75 (95)	2.75 (70)	3.75 (95)	5.25 (133)	3.63 (92)	5.82 (148)	4.41 (112)	7.28 (185)	
Minimum spacing at critical edge distance	$s_{min,cac}$	in. (mm)	1.5 (38)		2.25 (57)			3 (76)							
Minimum edge distance	c_{min}	in. (mm)	1.50 (38)					1.75 (44)							
Minimum anchor spacing at minimum edge distance	for s >	in. (mm)	3.0 (76)								4 (102)				
Mininimum hole depth in concrete	h_0	in. (mm)	2 (51)	2-7/8 (73)	1-7/8 (48)	2-3/4 (70)	3-1/2 (89)	2-5/8 (67)	3-3/8 (86)	4-5/8 (117)	3-5/8 (92)	5-3/8 (137)	4-3/8 (111)	6-5/8 (168)	
Minimum specified ultimate strength	f_{uta}	psi (N/mm²)	125,000 (860)		106,975 (738)	120,300 (829)		112,540 (776)			90,180 (622)		81,600 (563)		
Effective tensile stress area	$A_{se,N}$	in² (mm²)	0.045 (29.0)		0.086 (55.5)			0.161 (103.9)			0.268 (172.9)		0.392 (252.9)		
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85												8.4.3
Resistance modification factor for tension, steel failure modes[4]	R	-	0.70												D.5.3
Resistance modification factor for shear, steel failure modes[4]	R	-	0.65												D.5.3
Factored steel resistance in tension	N_{sar}	lb (kN)	3,370 (15.0)		5,475 (24.4)	6,150 (27.4)		10,780 (48.0)			14,405 (64.1)		19,050 (84.7)		D.6.1.2
Factored steel resistance in shear	V_{sar}	lb (kN)	855 (3.8)		2,030 (9.0)	2,865 (12.7)		5,110 (22.7)			6,200 (27.6)		9,205 (40.9)		D.7.1.2
Factored steel resistance in shear, seismic	$V_{sar,eq}$	lb (kN)	770 (3.4)		2,030 (9.0)	1,720 (7.7)		3,065 (13.6)			3,720 (16.5)		6,385 (28.4)		
Coeff. for factored conc. breakout resistance, uncracked concrete	$k_{c,uncr}$	lb	10					11.25							D.6.2.2
Coeff. for factored conc. breakout resistance, cracked concrete	$k_{c,cr}$	-	7												D.6.2.2
Modification factor for anchor resistance, tension, uncracked concrete[5]	$\psi_{c,N}$	-	1.0												D.6.2.6
Anchor category	-	-	3	1											D.5.3 (c)
Concrete material resistance factor	ϕ_c	-	0.65												8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B[6]	R	-	0.75	1.00											D.5.3 (c)
Factored pullout resistance in 20 MPa uncracked concrete[7]	$N_{pr,uncr}$	lb (kN)	675 (3.0)	1640 (7.3)	NA										D.6.3.2
Factored pullout resistance in 20 MPa cracked concrete[7]	$N_{pr,cr}$	lb (kN)	340 (1.5)	810 (3.6)	515 (2.3)	NA									D.6.3.2
Factored seismic pullout resistance in 20 MPa cracked concrete[7]	$N_{pr,eq}$	lb (kN)	275 (1.2)	810 (3.6)	515 (2.3)	NA									D.6.3.2

1 Design information in this table is taken from ICC-ES ESR-3027, dated February, 2016, tables 2, 3, and 4, and converted for use with CSA A23.3-14 Annex D.
2 See figure 1 of this section.
3 For concrete over metal deck applications where the concrete thickness over the top flute is less than h_{min} in this table, see figure 4 and tables 28 and 29 of this section.
4 The KWIK HUS-EZ is considered a brittle steel element as defined by CSA A23.3-14 Annex D section D.2.
5 For all design cases, $\psi_{c,N}$ = 1.0. The appropriate coefficient for breakout resistance for cracked concrete ($k_{c,cr}$) or uncracked concrete ($k_{c,uncr}$) must be used.
6 For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.
7 For all design cases, $\psi_{c,P}$ = 1.0. NA (not applicable) denotes that this value does not control for design. See section 4.1.4 of ESR-3027 for additional information.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 24 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in uncracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	665 (3.0)	710 (3.2)	750 (3.3)	820 (3.6)	805 (3.6)	900 (4.0)	985 (4.4)	1,135 (5.1)
	1.92 (49)	2-1/2 (64)	1,645 (7.3)	1,840 (8.2)	2,015 (9.0)	2,325 (10.4)	2,225 (9.9)	2,490 (11.1)	2,725 (12.1)	3,145 (14.0)
3/8	1.11 (28)	1-5/8 (41)	980 (4.4)	1,095 (4.9)	1,200 (5.3)	1,385 (6.2)	980 (4.4)	1,095 (4.9)	1,200 (5.3)	1,385 (6.2)
	1.86 (47)	2-1/2 (64)	2,120 (9.4)	2,375 (10.6)	2,600 (11.6)	3,000 (13.3)	2,120 (9.4)	2,375 (10.6)	2,600 (11.6)	3,000 (13.3)
	2.50 (64)	3-1/4 (83)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,675 (20.8)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,675 (20.8)
1/2	1.52 (39)	2-1/4 (57)	1,765 (7.8)	1,970 (8.8)	2,160 (9.6)	2,495 (11.1)	1,765 (7.8)	1,970 (8.8)	2,160 (9.6)	2,495 (11.1)
	2.16 (55)	3 (76)	2,990 (13.3)	3,340 (14.9)	3,660 (16.3)	4,225 (18.8)	2,990 (13.3)	3,340 (14.9)	3,660 (16.3)	4,225 (18.8)
	3.22 (82)	4-1/4 (108)	5,440 (24.2)	6,080 (27.0)	6,660 (29.6)	7,690 (34.2)	10,875 (48.4)	12,160 (54.1)	13,320 (59.3)	15,380 (68.4)
5/8	2.39 (61)	3-1/4 (83)	3,475 (15.5)	3,890 (17.3)	4,260 (18.9)	4,920 (21.9)	3,475 (15.5)	3,890 (17.3)	4,260 (18.9)	4,920 (21.9)
	3.88 (99)	5 (127)	7,195 (32.0)	8,040 (35.8)	8,810 (39.2)	10,170 (45.2)	14,385 (64.0)	16,085 (71.5)	17,620 (78.4)	20,345 (90.5)
3/4	2.92 (74)	4 (102)	4,695 (20.9)	5,250 (23.4)	5,750 (25.6)	6,640 (29.5)	9,390 (41.8)	10,500 (46.7)	11,505 (51.2)	13,280 (59.1)
	4.84 (123)	6-1/4 (159)	10,020 (44.6)	11,205 (49.8)	12,275 (54.6)	14,170 (63.0)	20,040 (89.2)	22,410 (99.7)	24,545 (109.2)	28,345 (126.1)

Table 25 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance with concrete/pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	340 (1.5)	360 (1.6)	385 (1.7)	415 (1.9)	565 (2.5)	630 (2.8)	690 (3.1)	795 (3.5)
	1.92 (49)	2-1/2 (64)	815 (3.6)	910 (4.1)	1,000 (4.4)	1,155 (5.1)	1,560 (6.9)	1,740 (7.7)	1,910 (8.5)	2,205 (9.8)
3/8	1.11 (28)	1-5/8 (41)	510 (2.3)	570 (2.5)	620 (2.8)	720 (3.2)	685 (3.0)	765 (3.4)	840 (3.7)	970 (4.3)
	1.86 (47)	2-1/2 (64)	1,485 (6.6)	1,660 (7.4)	1,820 (8.1)	2,100 (9.3)	1,485 (6.6)	1,660 (7.4)	1,820 (8.1)	2,100 (9.3)
	2.50 (64)	3-1/4 (83)	2,315 (10.3)	2,590 (11.5)	2,835 (12.6)	3,275 (14.6)	2,315 (10.3)	2,590 (11.5)	2,835 (12.6)	3,275 (14.6)
1/2	1.52 (39)	2-1/4 (57)	1,095 (4.9)	1,225 (5.5)	1,345 (6.0)	1,550 (6.9)	1,095 (4.9)	1,225 (5.5)	1,345 (6.0)	1,550 (6.9)
	2.16 (55)	3 (76)	1,860 (8.3)	2,080 (9.2)	2,275 (10.1)	2,630 (11.7)	1,860 (8.3)	2,080 (9.2)	2,275 (10.1)	2,630 (11.7)
	3.22 (82)	4-1/4 (108)	3,385 (15.1)	3,785 (16.8)	4,145 (18.4)	4,785 (21.3)	6,765 (30.1)	7,565 (33.7)	8,290 (36.9)	9,570 (42.6)
5/8	2.39 (61)	3-1/4 (83)	2,165 (9.6)	2,420 (10.8)	2,650 (11.8)	3,060 (13.6)	2,165 (9.6)	2,420 (10.8)	2,650 (11.8)	3,060 (13.6)
	3.88 (99)	5 (127)	4,475 (19.9)	5,005 (22.3)	5,480 (24.4)	6,330 (28.2)	8,950 (39.8)	10,005 (44.5)	10,965 (48.8)	12,660 (56.3)
3/4	2.92 (74)	4 (102)	2,920 (13.0)	3,265 (14.5)	3,580 (15.9)	4,130 (18.4)	5,845 (26.0)	6,535 (29.1)	7,155 (31.8)	8,265 (36.8)
	4.84 (123)	6-1/4 (159)	6,235 (27.7)	6,970 (31.0)	7,635 (34.0)	8,820 (39.2)	12,470 (55.5)	13,945 (62.0)	15,275 (67.9)	17,635 (78.4)

1 See section 3.1.8.6 to convert factored resistance value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Apply spacing, edge distance, and concrete thickness factors in tables 6 to 15 as necessary. Compare to the steel values in table 22. The lesser of the values is to be used for the design.
4 Tablular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60
5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.60
All other sizes - $\alpha_{N,seis}$ = 0.75
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 26 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6,7]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
		f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)
1/4	1-5/8 (41)	585 (2.6)	660 (2.9)	665 (3.0)	665 (3.0)	720 (3.2)	810 (3.6)	665 (3.0)	665 (3.0)
	2-1/2 (64)	1,200 (5.3)	1,470 (6.5)	1,220 (5.4)	1,220 (5.4)	1,255 (5.6)	1,535 (6.8)	1,805 (8.0)	1,805 (8.0)
3/8	1-5/8 (41)	830 (3.7)	1,020 (4.5)	835 (3.7)	835 (3.7)	950 (4.2)	1,165 (5.2)	2,030 (9.0)	2,030 (9.0)
	2-1/2 (64)	1,430 (6.4)	1,755 (7.8)	835 (3.7)	835 (3.7)	1,865 (8.3)	2,285 (10.2)	3,365 (15.0)	3,365 (15.0)
	3-1/4 (83)	2,505 (11.1)	3,070 (13.7)	1,990 (8.9)	1,990 (8.9)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	835 (3.7)	1,020 (4.5)	885 (3.9)	885 (3.9)	890 (4.0)	1,090 (4.8)	4,335 (19.3)	4,335 (19.3)
	3 (76)	1,955 (8.7)	2,395 (10.7)	1,615 (7.2)	1,615 (7.2)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,425 (15.2)	4,195 (18.7)	1,985 (8.8)	1,985 (8.8)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,670 (11.9)	3,270 (14.5)	1,915 (8.5)	1,915 (8.5)	n/a	n/a	n/a	n/a
	5 (127)	6,070 (27.0)	7,430 (33.1)	2,315 (10.3)	2,315 (10.3)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,670 (11.9)	3,270 (14.5)	2,075 (9.2)	2,075 (9.2)	n/a	n/a	n/a	n/a

Table 27 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
		f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)	f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350psi) lb (kN)
1/4	1-5/8 (41)	300 (1.3)	340 (1.5)	665 (3.0)	665 (3.0)	365 (1.6)	445 (2.0)	665 (3.0)	665 (3.0)
	2-1/2 (64)	595 (2.6)	730 (3.2)	1,220 (5.4)	1,220 (5.4)	625 (2.8)	765 (3.4)	1,805 (8.0)	1,805 (8.0)
3/8	1-5/8 (41)	520 (2.3)	635 (2.8)	835 (3.7)	835 (3.7)	755 (3.4)	930 (4.1)	2,030 (9.0)	2,030 (9.0)
	2-1/2 (64)	1,015 (4.5)	1,245 (5.5)	835 (3.7)	835 (3.7)	1,325 (5.9)	1,620 (7.2)	3,365 (15.0)	3,365 (15.0)
	3-1/4 (83)	1,775 (7.9)	2,175 (9.7)	1,990 (8.9)	1,990 (8.9)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	525 (2.3)	640 (2.8)	885 (3.9)	885 (3.9)	630 (2.8)	770 (3.4)	4,335 (19.3)	4,335 (19.3)
	3 (76)	1,235 (5.5)	1,510 (6.7)	1,615 (7.2)	1,615 (7.2)	n/a	n/a	n/a	n/a
	4-1/4 (108)	2,155 (9.6)	2,640 (11.7)	1,985 (8.8)	1,985 (8.8)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	1,680 (7.5)	2,060 (9.2)	1,915 (8.5)	1,915 (8.5)	n/a	n/a	n/a	n/a
	5 (127)	3,820 (17.0)	4,680 (20.8)	2,315 (10.3)	2,315 (10.3)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,680 (7.5)	2,060 (9.2)	2,075 (9.2)	2,075 (9.2)	n/a	n/a	n/a	n/a

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x h_{nom} (nominal embedment).
4 Tabular values are lightweight concrete and no additional reduction factor is needed.
5 No additional reduction factors for spacing or edge distance need to be applied.
6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.60
All other sizes - $\alpha_{N,seis}$ = 0.75.
See section 3.1.8.7 for additional information on seismic applications.
8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

3.3.6

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 28 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of uncracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	665 (3.0)	750 (3.3)	805 (3.6)	985 (4.4)
3/8	1.11 (28)	1-5/8 (41)	980 (4.4)	1,200 (5.3)	980 (4.4)	1,200 (5.3)

Table 29 - Hilti KWIK HUS-EZ carbon steel screw anchor factored resistance in the top of cracked concrete over metal deck[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
1/4	1.18 (30)	1-5/8 (41)	340 (1.5)	385 (1.7)	565 (2.5)	690 (3.1)
3/8	1.11 (28)	1-5/8 (41)	510 (2.3)	620 (2.8)	685 (3.0)	840 (3.7)

1 See Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 22. The lesser of the values is to be used for the design.

4 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows:
for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-inch diameter - $\alpha_{N,seis}$ = 0.60
3/8-inch diameter- $\alpha_{N,seis}$ = 0.75.
No reduction needed for seismic shear. See section 3.1.8.7 for additional information on seismic applications.

3.3.6.3.3 Allowable Stress Design for masonry

Table 30 – Allowable tension loads for Hilti KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Loads @ c_{cr} and s_{cr}	Spacing			Edge distance
			Critical - s_{cr} in.[7]	Minimum - s_{min} in.[7]	Load reduction factor at s_{min} [8]	Critical - c_{cr} in.[9]
1/4	1-5/8[10]	530	4	2	0.70	4
	2-1/2[11]	910		4	1.00	
3/8	1-5/8[11]	535	4	2	0.70	4
	2-1/2	895	6	4	0.80	
	3-1/4	1,210				
1/2	2-1/4	710	4	2	0.60	4
	3	1,110	8	4		
	4-1/4	1,515				
5/8	3-1/4	1,155	10	4	0.60	4
	5	1,735				
3/4	4	1,680	12	4	0.60	4
	6-1/4	2,035				

Table 31 – Allowable shear loads for Hilti KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Load at c_{cr} and s_{cr}	Spacing			Edge distance			
								Load reduction factor at c_{min}	
			Critical - s_{cr} in.[7]	Minimum - s_{min} in.[7]	Load reduction factor at s_{min} [8]	Critical - c_{cr} in.[9]	Minimum - c_{min} in.[9]	perpendicular to edge	parallel to edge
1/4	1-5/8	675	4	4	1.00	4	4	1.00	1.00
	2-1/2	840						1.00	1.00
3/8	1-5/8	1,140	6	4	0.94	6	4	0.61	1.00
	2-1/2	1,165						0.70	1.00
	3-1/4	1,190						0.70	1.00
1/2	2-1/4	1,845	8	4	0.88	8	4	0.50	1.00
	3	2,055						0.45	0.94
	4-1/4	2,745						0.40	0.89
5/8	3-1/4	3,040	10	4	0.36	10	4	0.36	0.82
	5	3,485						0.34	0.92
3/4	4	3,040	10	4	0.36	10	4	0.36	0.82
	6-1/4	3,485						0.34	0.92

1 All values are for anchors installed in fully grouted masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight.

2 Anchors may not be installed within one inch in any direction of a vertical joint.

3 Linear interpolation of load values between minimum spacing s_{min} and critical spacing s_{cr} and between minimum edge distance c_{min} and critical edge distance c_{cr} is permitted.

4 For combined loading: For 1/4-in. - $\frac{T_{applied}}{T_{allowable}} + \frac{V_{applied}}{V_{allowable}} \le 1$ For 3/8- through 3/4-in. - $\left(\frac{T_{applied}}{T_{allowable}}\right)^{5/3} + \left(\frac{V_{applied}}{V_{allowable}}\right)^{5/3} \le 1$

5 See figure 5 for anchor locations.

6 Embedment depth is measured from the outside face of the concrete masonry embedment.

7 Critical spacing s_{cr} is the anchor spacing where full load values may be used. The minimum spacing s_{min} is the minimum spacing for which values are available and installation is recommended. Spacing is measured from the center of one anchor to the center of the adjacent anchor.

8 Load reduction factors are multiplicative, both spacing and edge distance load reduction factors must be considered. Load values for anchors installed at less than c_{cr} or s_{cr} must be multiplied by the appropriate load reduction factor based on actual edge distance (c) or spacing (s).

9 The critical edge distance c_{cr} is the edge distance where full load values may be used. The minimum edge distance c_{min} is the minimum edge distance for which values are available and installation is recommended. For tension, c_{cr} equals c_{min}. Edge distance is measured from the center of the anchor to the closest edge.

10 Load values must be reduced by 21% for installations within 1-1/4 inches of the bed joint.

11 Load values must be reduced by 13% for installations within 1-1/4 inches of the bed joint.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 32 – Hilti KWIK HUS-EZ allowable loads installed in top-of-grout-filled concrete masonry walls or horizontal members of wall openings[1,2,3]

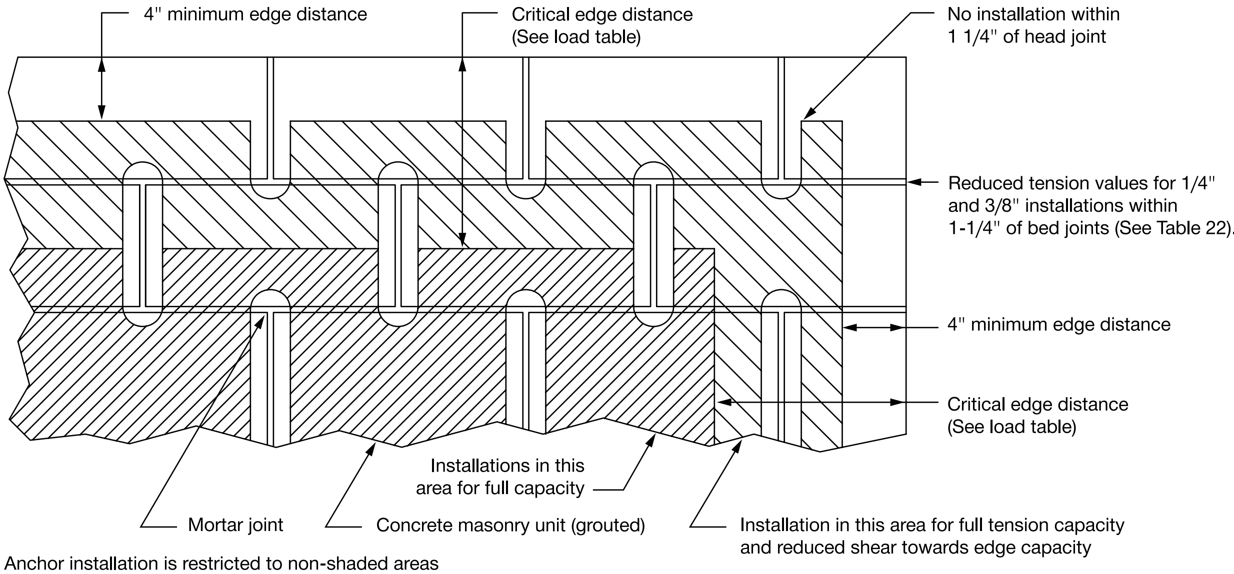
Nominal anchor diameter in.	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb Load direction Parallel to edge of masonry wall	Shear lb Load direction Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	205	180	135
		3 3/4			205	275	275
	2 1/2	1 1/2			355	345	155
		3 3/4			390	415	330
3/8	1 5/8	1 1/2	6	6	245	345	175
		3 3/4			245	345	345
	3 1/4	1 1/2			465	490	200
		3 3/4			540	800	625
1/2	2 1/4	1 3/4	8	8	390	460	200
		3 3/4			610	525	500
	4 1/4	1 3/4			540	885	245
		3 3/4			750	1275	550
5/8	5	1 3/4	10	10	975	930	245
		3 3/4			975	2190	630
3/4	6 1/4	3 3/4	12	12	975	2430	630

Table 33 – Hilti KWIK HUS-EZ allowable loads installed in end-of-wall or vertical members of wall openings[1,2,3]

Nominal anchor diameter in.	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb Load direction Parallel to edge of masonry wall	Shear lb Load direction Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	360	525	205
		3 3/4			380	595	585
	2 1/2	1 1/2			590	610	225
		3 3/4			755	635	585
3/8	1 5/8	1 1/2	6	6	355	725	215
		3 3/4			465	1010	825
	3 1/4	1 1/2			565	875	240
		3 3/4			1020	1195	1050
1/2	2 1/4	1 3/4	8	8	500	855	260
		3 3/4			525	1100	1050
	4 1/4	1 3/4			650	925	280
		3 3/4			1150	1240	1050
5/8	5	3 3/4	10	10	1605	2215	1050
3/4	6 1/4	3 3/4	12	12	1865	2550	1050

1 All values are for anchors installed in fully grouted concrete masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight conforming to ASTM C90. Allowable loads are calculated using safety factor of 5.
2 See figure 6 and 7 for allowable anchor installation locations on the top of grout-filled concrete masonry walls. Anchors may not be installed within one inch of a vertical joint. See figure 7 for anchor installation locations in end-of-wall and vertical members of wall openings.
3 Anchors may not be installed within one inch in any direction of a vertical joint.
4 For load values at edge distances between listed values linear interpolation is permitted.
5 Critical spacing equals minimum spacing.
6 Minimum end distance applicable to top-of-wall and end-of-wall and does not apply for wall openings such as windows.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6



Anchor installation is restricted to non-shaded areas

Figure 5 – Acceptable locations (shaded areas) for Hilti KWIK HUS-EZ anchors in grout-filled concrete masonry

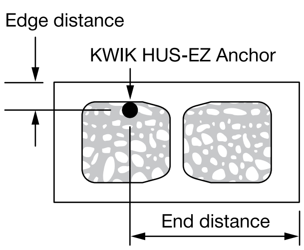


Figure 6 – Edge and end distances for the Hilti KWIK HUS-EZ anchor installed in the top of CMU masonry wall construction

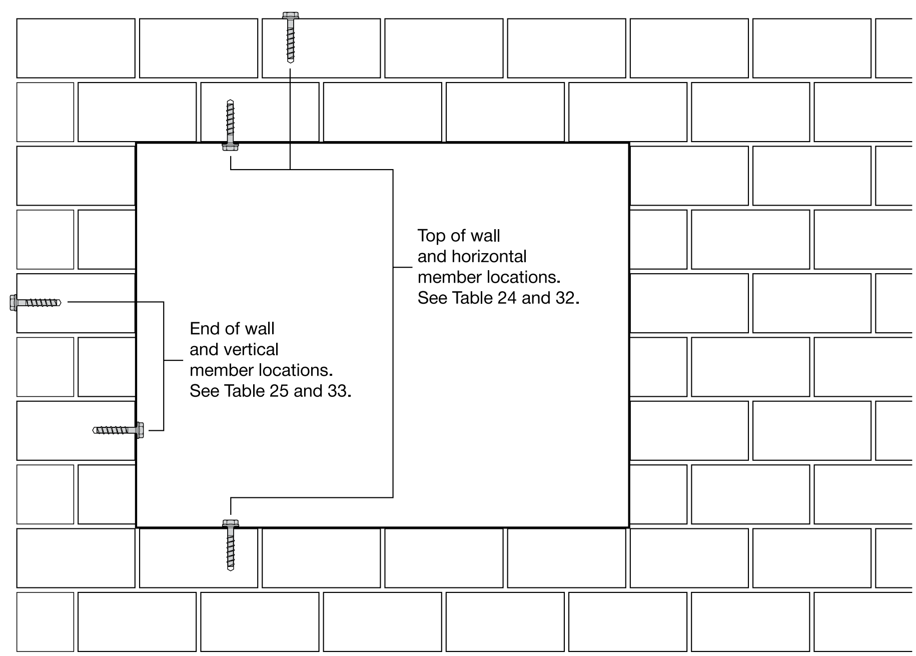


Figure 7 – Anchor locations in end of wall or wall opening applications

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

3.3.6.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at **www.hilti.com**. Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

3.3.6.5 Ordering Information

Order Information

Description	Hole Diameter	Total Length without Anchor Head	Minimum Embedment Depth	Qty (pcs) / Box
KH-EZ 1/4"x1-7/8"	1/4"	1-7/8"	1-5/8"	100
KH-EZ 1/4"x2-5/8"	1/4"	2-5/8"	2-1/2"	100
KH-EZ 1/4"x3"	1/4"	3"	2-1/2"	100
KH-EZ 1/4"x3-1/2"	1/4"	3-1/2"	2-1/2"	100
KH-EZ 1/4"x4"	1/4"	4"	2-1/2"	100
KH-EZ 3/8"x1-7/8"	3/8"	1-7/8"	1-5/8"	50
KH-EZ 3/8"x2-1/8"	3/8"	2-1/8"	1-5/8"	50
KH-EZ 3/8"x3"	3/8"	3"	2-1/2"	50
KH-EZ 3/8"x3-1/2"	3/8"	3-1/2"	2-1/2"	50
KH-EZ 3/8"x4"	3/8"	4"	3-1/4"	50
KH-EZ 3/8"x5"	3/8"	5"	3-1/4"	30
KH-EZ 1/2"x2-1/2"	1/2"	2-1/2"	2-1/4"	30
KH-EZ 1/2"x3"	1/2"	3"	2-1/4"	30
KH-EZ 1/2"x3-1/2"	1/2"	3-1/2"	3"	25
KH-EZ 1/2"x4"	1/2"	4"	3"	25
KH-EZ 1/2"x4-1/2"	1/2"	4-1/2"	4 1/4"	25
KH-EZ 1/2"x5"	1/2"	5"	4 1/4"	25
KH-EZ 1/2"x6"	1/2"	6"	4-1/4"	25
KH-EZ 5/8"x3-1/2"	5/8"	3-1/2"	3-1/4"	15
KH-EZ 5/8"x4"	5/8"	4"	3-1/4"	15
KH-EZ 5/8"x5-1/2"	5/8"	5-1/2"	3-1/4"	15
KH-EZ 5/8"x6-1/2"	5/8"	6-1/2"	3-1/4"	15
KH-EZ 5/8"x8"	5/8"	8"	3-1/4"	15
KH-EZ 3/4"x4-1/2"	3/4"	4-1/2"	4"	10
KH-EZ 3/4"x5-1/2"	3/4"	5-1/2"	4"	10
KH-EZ 3/4"x7"	3/4"	7"	4"	10
KH-EZ 3/4"x8"	3/4"	8"	4"	10
KH-EZ 3/4"x9"	3/4"	9"	4"	10

BXUV.G556

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

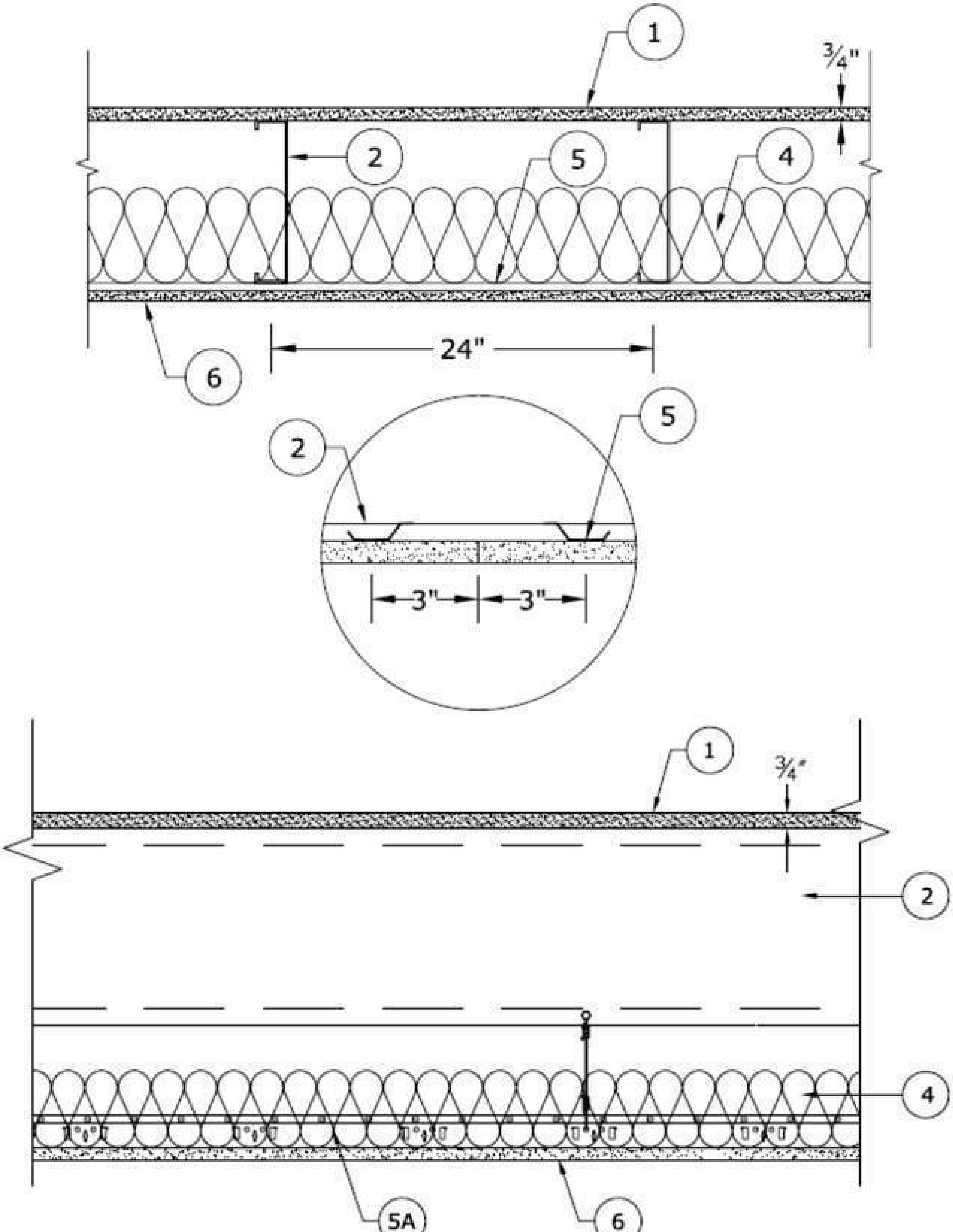
Design No. G556

November 12, 2019

Unrestrained Assembly Rating — 1, 1-1/2 and 2 Hr (See Item 1)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Flooring System —**

1 or 1-1/2 Hr Rating

1A. Structural Cement-Fiber Units* — Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.

Unrestrained Assembly Rating is 1 hour when Item 2A or 2B is used. Unrestrained Assembly Rating is 1-1/2 hour when Item 2 is used.

UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

2 Hr Rating

System A

1A. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

1B. **Gypsum Board* (Not Shown) —** Two layers of min 1/4 in. thick, 4 ft by 4 ft gypsum board underlayment, Classified as to Surface Burning Characteristics. Bonded and attached to each other with a mortar applied with a 1/4 in. by 1/4 in. notched trowel, and min 1/2 in. long staples spaced max 8 in. OC in the field and 4 in. OC along the perimeter. Joints between two layers of Gypsum Board staggered a min of 12 in. in both directions.
UNITED STATES GYPSUM CO — Type FRX-G

1C. **Floor Mat Materials* —** (Optional) — Floor mat material loosely laid over Structural Cement-Fiber Units (Item 1A). Gypsum Board Item 1B loosely laid over floor mat material with joints of bottom layer of Gypsum Board staggered a minimum of 12 in. in both directions.
KINETICS NOISE CONTROL INC — Type Soundmatt

PLITEQ INC — Types GenieMat RST02, GenieMat RST05

System B

1A. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

1B. **Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
UNITED STATES GYPSUM CO — Types LRK, HSLRK, CSD

USG MEXICO S A DE C V — Types LRK, HSLRK, CSD

Floor Mat Materials* — (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

UNITED STATES GYPSUM CO — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

Alternate Floor Mat Materials* — (Optional) - Floor mat material nom 3/8 in. thick loose laid over the subfloor. Floor topping thickness a min 3/4 in. over the floor mat.
GRASSWORX L L C — Type SC50

2. **Steel Joists —** Channel-shaped, min 10 in. deep with min 1-5/8 in. wide flanges and 1/2 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 50,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2A. **Steel Joists —** (Not Shown) -As an alternate to Item 2 - For maximum clear spans not exceeded 8 ft. Channel-shaped, min 6 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 18 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2B. **Steel Joists —** (Not Shown) -As an alternate to Item 2 - Channel-shaped, min 8 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2C. **Steel Joists —** As an alternate to item 2 only - The joists are channel-shaped, 10 in. min depth. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to rim joist with a minimum of three #10 3/4 in. long self-drilling screws at the rim track clip to the outside of the web joist, and a #10 1/2 in. long screw through the top and bottom flange of the joists to the top and bottom flange of the rim track. At rim joist splices bearing on supports, rim joists are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with a minimum of six 3/4 in. long self-drilling #10 screws to each rim piece. For use with item 3C.
CALIFORNIA EXPANDED METAL PRODUCTS CO — Type SSCJ floor joists, SSRT rim joists or Type SSTT rim joists. When Type SSTT rim joists are used, secured to preformed clip tabs in accordance with manufacturers installation instructions.

2D. **Clip Angles —** No. 16 MSG, 9-3/4 in. long steel angles with 2 in. legs. Secured to track and joist with eight No.10, 3/4 in. long, self drilling, hex head screws, located 1 in. from each end of clip angle, with the other two screws on each leg evenly spaced. Only one clip angle per joist end.

2E. **Clip Angles —** (Not Shown) - As an alternate to Item 2C, for use with 6 or 8 in. deep joists (Item 2A or 2B). No. 16 MSG, 5-1/2 in. long steel angles with 1-1/2 in. legs for 6 in. deep joists and No. 18 MSG, 7-1/4 in. long steel angles with 1-1/2 in. legs for 8 in. deep joists. Secured to track and joist with six No.10, 3/4 in. long, self drilling, hex head screws, located 1 in. from each end of the clip angle and at the centerline. Only one clip angle per joist end.

2F. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 2, 2a, 2b and 2c - Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel chord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness spaced a maximum of 24 in. OC.
AEGIS METAL FRAMING, DIV OF MITEK — Ultra-Span, Pre-fabricated Light Gauge Steel Truss System

TRUSSTEEL, DIV OF ITW BUILDING COMPONENTS INC — TrusSteel

2G. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 2, 2a, 2b,2c and 2f - Pre-fabricated steel truss system consisting of cold-formed, galvanized steel chord and web sections. Truss top and bottom chords min. 4 in. high by 1-11/16 in. wide by 18 ga. Truss webs min. 1-1/2 in. by 1-1/2 in. by 20 ga. square tube bent and triangulated as shown. Chords and web connected by fillet welds. Overall truss depth min. 12 in. Trusses spaced a max of 24 in. OC. Truss ends placed over and secured to Bearing Seats (Item 2G1) with two min. #10 by 3/4 in. long screws on each side of Bearing Seats. Allowable loading must be

calculated so as to stress the steel trusses to a maximum of 98% of the stress calculated in accordance with the allowable stress design approach outlined in the manufacturer's load tables.
EISEN PANEL SYSTEMS L L C — Type Gateway Panel pre-fabricated steel truss system.

2G1. **Bearing Seats* —** (Not Shown) — Galvanized steel tube, min. 1 in. by 2-1/2 in. by 13 ga., oriented vertically and welded to min. 4 in. by 4 in. by 10 ga., galvanized steel plate. Bearing seats spaced 24 in. OC and attached to bearing supports by welding or screw attaching the steel plate to the bearing supports.

EISEN PANEL SYSTEMS L L C — Type Gateway Panel bearing seat.

2G2. **Bracing —** (Not Shown) - For use with Item 2G — Galvanized channel-shaped steel sections, min. 1-1/2 in. wide with 1/4 in. flanges, min. 16 ga. Bracing attached to underside of trusses with min. #10 by 3/4 in. long screws through truss bottom chord. Bracing installed in truss cavities by scoring, bending and flattening the ends to form a tab for attachment to truss top and bottom chords. Two pieces of bracing crossed and tabs secured to truss chords with min. #10 by 3/4 in. long screws. Location and spacing of underside and crossed bracing to be specified on truss engineering.

2H. **Steel Trusses —** As an alternate to Items 2, 2A, 2B, 2C, 2F and 2G - Cold-formed galvanized steel truss chord and web sections manufactured from steel conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chord and web sections as required by design to meet governing code requirements. Truss members connected together with No. 10-16 (min size) self-drilling screws or equivalent. Truss chord and web members to be designed in accordance with the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members, 1996 Edition. Trusses spaced a max of 24 in. OC. Where the truss intersects with the interior face of the exterior walls, the min truss depth shall be 12 in.

2I. **Steel Joists —** As an alternate to Items 2, 2A, 2B, 2C, 2F, 2G and 2H, minimum 12K1, spaced a max 24 in. OC.

2J. **Structural Steel Members* —** As an alternate to Item 2 - Limited to the 1 Hour Ratings. Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel cord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness. Trusses spaced a max of 24 in. OC. Location of lateral bracing for truss chord and web sections to be specified on truss engineering.
TRUSS LINK INC — Truss Link

3. **Joist Bridging —** (Not Shown) - For use with Item 2 and 2B - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of joist sections cut to length and placed between outer supports, adjacent to openings and at mid span with 8 ft OC max spacing. Bridging channels are screw-attached at each end to joist web using angle clips. V-bracing of 1-1/2 in. by 20-ga galvanized steel is screw-attached to bottom joist flange between bridging channels.

3A. **Joist Bridging —** (Not Shown) - For use with Item 2A - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of rim track sections cut to length, with two 4 in. long folded back flanges, and placed between outer supports, adjacent to openings and at mid span with 10 ft OC max spacing. Bridging channels are screw-attached to each of the four top and bottom joist flanges with two No. 8 by 1/2 in. long wafer head steel screws.

3B. **Joist Bridging —** (Not Shown) - For use with Item 2A and 2B - 1-1/2 in. wide strips formed from 20 MSG - The structural bridging is installed perpendicular to and on the bottom surface of the joists at mid-span with one #10 x 3/4 in. long hex head steel screw at each interface.

3C. **Joist Bridging —** Not shown — For use with item 2C. Installed immediately after joists are erected and before construction loads are applied. The structural bridging, Type CEMCO Sure Bridging, consisting of No. 18 MSG galv steel, 2-1/2 in. wide by 25-1/2 in. long with 1-5/16 in. long legs structural bridging staggered between the steel joists and attached to the bottom joist flange with two #10 1/2 in. long self-drilling screws at each end tab of bridging. Solid bridging consisting of cut to length joist sections placed between outer joists and at center joist with 8 ft OC max spacing. Solid bridging is seated in the structural bridging and is screw-attached at joist web using Type CEMCO Sure-Support Clips (1-1/2 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg on one side and the other side with Type CEMCO Sure-Support Clips (4 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg.

3D. **Bridging —** (Not Shown)—For use with Item 2F - Location of lateral bracing for truss chord and web sections to be specified on truss engineering.

4. **Batts and Blankets* —** 3-5/8 in. thick glass fiber batt insulation draped over the resilient channels (Item 5) or suspension system grid (Item 5A). Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics having a flame spread index of 25 or less and a smoke developed index of 50 or less may be used. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

5. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two channels, spaced 6 in. OC, oriented opposite each gypsum board end joint as shown on the illustration above. Additional channels shall extend min 6 in. beyond each side edge of board.

5A. **Steel Framing Members* —** (Optional, Not Shown) — When it is desired to drop the ceiling below the bottom plane of the structural steel members (Item 2), a suspension system may be used in lieu of the resilient channels. Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long , 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC a min of 4 in. below bottom flange of joists, twist tied to #10 - 3/4 in. long screws installed in the web, 1/2 in. from the bottom flange of the steel joists. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft or 12 ft long, installed perpendicular to main runners, spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.

CGC INC — Type DGL or RX

USG INTERIORS LLC — Type DGL or RX.

5B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.

PLITEQ INC — Type Genie Clip

5C. **Alternate Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Items 5 to 5B, furring channels and Steel Framing Members as described below.

a. **Furring channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the steel joists (Item 2). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 6.

PAC INTERNATIONAL L L C — Types RSIC-1 or RSIC-1 (2.75)

5D. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —**

Formed of No. 25 MSG galv steel, 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b.

b. **Steel Framing Members* —**

Used to attach furring channels (Item a) to the steel joists (Item 2). Clips spaced at 48 in. OC and secured to the bottom of the joists with one 2-1/2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 6.

REGUPOL AMERICA — Type SonusClip

6. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels, furring channels or cross tees of suspension system. Gypsum panels secured to resilient/furring channels or drywall suspension system with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel midspan, and 1-1/2 in. from side edges of the board. End joints secured to both resilient/furring channels as shown in end joint detail. When **Steel Framing Members** (Item 5B or 5C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.

When **Steel Framing Members** (Item 5D) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, an additional single length of furring channel shall be installed and be spaced approximately 3 in. from the butt joint (6 in. from the continuous furring channels) to support the floating end of the gypsum board. Each of these shorter sections of furring channel shall extend one joist beyond the width of the gypsum panel and be attached to the adjacent joists with one SonusClip at every joist involved with the butt joint.

CGC INC — Types C, IP-X2, IPC-AR, ULIX

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG MEXICO S A DE C V — Types C, IP-X2, IPC-AR

NATIONAL GYPSUM CO — Type FSW-C

6A. **Gypsum Board* —** For use when Steel Framing Members* (Item 5A) are used - One layer of 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side edges centered over main runners and joints centered over cross tees or channels. Fastened to cross tees or channels with 1 in. long Type S screws bugle-head screws spaced 8 in. OC with the screws located 4 in. from the midspan of the cross tee or channel, and 1-1/2 in. from side edges of gypsum panel. Fastened to main runners with 1 in. long Type S bugle-head screws spaced midway between cross tees or channels. End joints of gypsum panels shall be staggered not less than 4 ft OC with adjacent gypsum panels end joints.
CGC INC — Types C, IP-X2, IPC-AR, ULIX

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG MEXICO S A DE C V — Types C, IP-X2, IPC-AR

NATIONAL GYPSUM CO — Type FSW-C

7. **Finishing System - (Not Shown) —** Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Last Updated on 2019-11-12

BXUV.P561

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

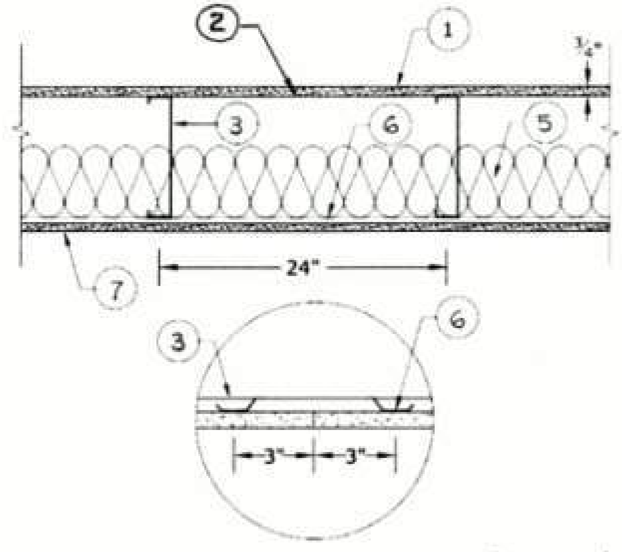
Design No. P561

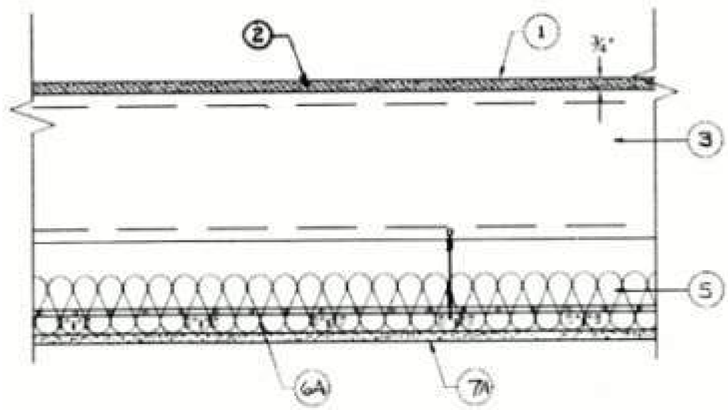
November 18, 2019

Unrestrained Assembly Rating — 1, 1-1/2 and 2 Hr.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**





1. **Roof Covering* —** Consisting of hot-mopped or cold-application materials which provide Class A, B or C coverings, directly applied to Structural Cement-Fiber Units(Item 2). See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

1A **Roofing Membrane* —** (Not Shown) — In lieu of Item 1, single-ply membrane that is either ballasted, adhered or mechanically attached to Structural Cement-Fiber Units(Item 2). See Fire Resistance Directory-Roofing Membranes (CHCI) Category

Roofing System — 1 or 1-1/2 Hr Rating

2. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
Unrestrained Assembly Rating is 1 hour when Item 3A or 3B is used. Unrestrained Assembly Rating is 1-1/2 hour when Item 3, 3C, 3F, 3G, or 3H is used.

UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

2 Hr Rating

2. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

2A. **Gypsum Board* (Not Shown) —** Min 1/2 in. thick gypsum board, Classified as to Surface Burning Characteristics. Boards loosely laid, adhered or mechanically attached to Structural Cement-Fiber Units. Joints between Structural Cement Fiber Units and of Gypsum Board staggered a min of 6 in. See Gypsum Board (BWFR) Category in the Building Materials Directory or Roofing Systems (TGFU) in the Roofing Material Directory or Gypsum Board (CKNX) Category in the Fire Resistance Directory.
UNITED STATES GYPSUM CO — Type FRX-G

3. **Structural Steel Members —** Channel-shaped, min 10 in. deep with min 1-5/8 in. wide flanges and 1/2 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 50,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3A. **Structural Steel Members —** (Not Shown) -As an alternate to Item 3 - For maximum clear spans not exceeded 8 ft. Channel-shaped, min 6 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 18 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3B. **Structural Steel Members —** (Not Shown) -As an alternate to Item 3 - Channel-shaped, min 8 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3C. **Structural Steel Members* —** (Not Shown) -As an alternate to item 3 only - The joists are channel-shaped, 10 in. min depth. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to rim joist with a minimum of three #10 3/4 in. long self-drilling screws at the rim track clip to the outside of the web joist, and a #10 1/2 in. long screw through the top and bottom flange of the joists to the top and bottom flange of the rim track. At rim joist splices bearing on supports, rim joists are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with a minimum of six 3/4 in. long self-drilling #10 screws to each rim piece. For use with item 3C.
CALIFORNIA EXPANDED METAL PRODUCTS CO — Type SSCJ floor joists, SSRT rim joists or Type SSTT rim joists. When Type SSTT rim joists are used, secured to preformed clip tabs in accordance with manufacturers installation instructions.

3D. **Clip Angles —** (Not Shown) - No. 16 MSG, 9-3/4 in. long steel angles with 2 in. legs. Secured to track and joist with eight No.10, 3/4 in. long, self-drilling, hex head screws, located 1 in. from each end of clip angle, with the other two screws on each leg evenly spaced. Only one clip angle per joist end.

3E. **Clip Angles —** (Not Shown) - As an alternate to Item 3D, for use with 6 or 8 in. deep joists (Item 3A or 3B). No. 16 MSG, 5-1/2 in. long steel angles with 1-1/2 in. legs for 6 in. deep joists and No. 18 MSG, 7-1/4 in. long steel angles with 1-1/2 in. legs for 8 in. deep joists. Secured to track and joist with six No.10, 3/4 in. long, self-drilling, hex head screws, located 1 in. from each end of the clip angle and at the centerline. Only one clip angle per joist end.

3F. **Structural Steel Members* —** (Not Shown) -As an alternate to Item 3 only. The proprietary joists are channel-shaped, min 9-1/4 in. deep. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to joist rim with three 3/4 in. long No. 10 x 16 self-drilling steel TEK screws through tab to the outside of the web. At joist rim splices bearing on supports, joists rims are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with four 3/4 in. long No. 10 x 16 self-drilling steel TEK screws to each rim piece.
CLARKDIETRICH BUILDING SYSTEMS — Type TDJ or TDW Floor Joists, TD24 Rim Joist

3G. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 3, 3A, 3B, 3C and 3F - Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel chord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness spaced a maximum of 24 in. OC.
AEGIS METAL FRAMING, DIV OF MITEK — Ultra-Span, Pre-fabricated Light Gauge Steel Truss System

TRUSSTEEL, DIV OF ITW BUILDING COMPONENTS INC — TrusSteel

3H. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 3, 3A, 3B, 3C, 3F and 3G, - Pre-fabricated steel truss system consisting of cold-formed, galvanized steel chord and web sections. Truss top and bottom chords min. 4 in. high by 1-11/16 in. wide by 18 ga. Truss webs min. 1-1/2 in. by 1-1/2 in. by 20 ga. square tube bent and triangulated as shown. Chords and web connected by fillet welds. Overall truss depth min. 12 in. Trusses spaced a max of 24 in. OC. Truss ends placed over and secured to Bearing Seats (Item 3H1) with two min. #10 by 3/4 in. long screws on each side of Bearing Seats. Allowable loading must be calculated so as to stress the steel trusses to a maximum of 98% of the stress calculated in accordance with the allowable stress design approach outlined in the manufacturer's load tables.
EISEN PANEL SYSTEMS L L C — Type Gateway Panel pre-fabricated steel truss system.

3H1. **Bearing Seats* —** ((Not Shown) — Galvanized steel tube, min. 1 in. by 2-1/2 in. by 13 ga., oriented vertically and welded to min. 4 in. by 4 in. by 10 ga., galvanized steel plate. Bearing seats spaced 24 in. OC and attached to bearing supports by welding or screw attaching the steel plate to the bearing supports.
EISEN PANEL SYSTEMS L L C — Type Gateway Panel bearing seat.

3H2. **Bracing —** (Not Shown) - For use with Item 3H — Galvanized channel-shaped steel sections, min. 1-1/2 in. wide with 1/4 in. flanges, min. 16 ga. Bracing attached to underside of trusses with min. #10 by 3/4 in. long screws through truss bottom chord. Bracing installed in truss cavities by scoring, bending and flattening the ends to form a tab for attachment to truss top and bottom chords. Two pieces of bracing crossed and tabs secured to truss chords with min. #10 by 3/4 in. long screws. Location and spacing of underside and crossed bracing to be specified on truss engineering.

3I. **Steel Trusses —** As an alternate to Items 3, 3A, 3B, 3C, 3F, 3G and 3H - Cold-formed galvanized steel truss chord and web sections manufactured from steel conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chord and web sections as required by design to meet governing code requirements. Truss members connected together with No. 10-16 (min size) self-drilling screws or equivalent. Truss chord and web members to be designed in accordance with the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members, 1996 Edition. Trusses spaced a max of 24 in. OC. Where the truss intersects with the interior face of the exterior walls, the min truss depth shall be 12 in.

3J. **Steel Joists —** As an alternate to Items 3, 3A, 3B, 3C, 3F, 3G, 3H and 3I, minimum 12K1, spaced a max 24 in. OC.

3K. **Structural Steel Members* —** As an alternate to Item 3 - Limited to the 1 Hour Ratings. Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel cord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness. Trusses spaced a max of 24 in. OC. Location of lateral bracing for truss chord and web sections to be specified on truss engineering.
TRUSS LINK INC — Truss Link

4. **Joist Bridging —** (Not Shown) - For use with Item 3 and 3B - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of joist sections cut to length and placed between outer supports, adjacent to openings and at mid span with 8 ft OC max spacing. Bridging channels are screw-attached at each end to joist web using angle clips. V-bracing of 1-1/2 in. by 20-ga galvanized steel is screw-attached to bottom joist flange between bridging channels.

4A. **Joist Bridging —** (Not Shown) - For use with Item 3A - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of rim track sections cut to length, with two 4 in. long folded back flanges, and placed between outer supports, adjacent to openings and at mid span with 10 ft OC max spacing. Bridging channels are screw-attached to each of the four top and bottom joist flanges with two No. 8 by 1/2 in. long wafer head steel screws.

4B. **Joist Bridging —** (Not Shown) - For use with Item 3A and 3B - 1-1/2 in. wide strips formed from 20 MSG - The structural bridging is installed perpendicular to and on the bottom surface of the joists at mid-span with one #10 x 3/4 in. long hex head steel screw at each interface.

4C. **Joist Bridging —** (Not shown) — For use with item 3C. Installed immediately after joists are erected and before construction loads are applied. The structural bridging, Type CEMCO Sure Bridging, consisting of No. 18 MSG galv steel, 2-1/2 in. wide by 25-1/2 in. long with 1-5/16 in. long legs structural bridging staggered between the steel joists and attached to the bottom joist flange with two #10 1/2 in. long self-drilling screws at each end tab of bridging. Solid bridging consisting of cut to length joist sections placed between outer joists and at center joist with 8 ft OC max spacing. Solid bridging is seated in the structural bridging and is screw-attached at joist web using Type CEMCO Sure-Support Clips (1-1/2 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg on one side and the other side with Type CEMCO Sure-Support Clips (4 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg.

4D. **Joist Bridging —** (Not Shown) —For use with Item 3F. Installed at the center of the joist span immediately after joists are erected and before construction loads are applied. The bridging (2-1/2 TDSB18) consists of No. 18 MSG galv steel channels, 2-1/2 in. wide by 1-1/4 in. deep by 21-3/4 in. long with 2-1/8 in. long web extensions at each end for screw-attachment to the bottom flange of the steel joists with a 3/4 in. long No. 10 x 16 self-drilling steel TEK screw. Solid bridging consisting of cut-to-length joist sections placed between the outermost joists and between the centermost joists with a max spacing of 8 ft OC. Solid bridging are screw-attached at joist web using a 1-1/2 by 1-1/2 by 7 in. long, No. 16 MSG, min 50 ksi steel support clip (EasyClip S-Series S547) with two 3/4 in. long No. 10 x 16 self-drilling steel TEK screws per leg on one side and on the other side with a 4 by 1-1/2 by 7 in. long No. 16 MSG, min 50 ksi steel support clip (EasyClip E-Series E547) with two 3/4 in. long No. 10 x 16 self-drilling steel TEK screws per leg.

4E. **Bridging —** (Not Shown)—For use with Item 3G - Location of lateral bracing for truss chord and web sections to be specified on truss engineering.

5. **Batts and Blankets* —** Glass fiber insulation, min 3-1/2 in. thick, bearing the UL Classification Marking for Surface Burning Characteristics. Min density of 0.5 pcf. The insulation shall be fitted in the concealed space, draped over the resilient channel (Item 6) or steel frame members (Item 6A) and gypsum board (Item 8) ceiling membrane. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

6. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two channels, spaced 6 in. OC, oriented opposite each gypsum board end joint as shown on the illustration above. Additional channels shall extend min 6 in. beyond each side edge of board.

6A. **Steel Framing Members* —** (Optional) — When it is desired to drop the ceiling below the bottom plane of the structural steel members (Item 3), a suspension system may be used in lieu of the resilient channels. Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long , 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC a min of 4 in. below bottom flange of joists, twist tied to #10 - 3/4 in. long screws installed in the web, 1/2 in. from the bottom flange of the steel joists. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft or 12 ft long, installed perpendicular to main runners, spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.

CGC INC — Type DGL or RX

USG INTERIORS LLC — Type DGL or RX.

6B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 3). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.
PLITEQ INC — Type Genie Clip

6C. **Alternate Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Items 6 to 6B, furring channels and Steel Framing Members as described below.

a. **Furring channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the steel joists (Item 3). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 7.
PAC INTERNATIONAL L L C — Types RSIC-1 or RSIC-1 (2.75)

7. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient/furring channels. Gypsum panels secured to resilient/furring channels with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel mid-span, and 1-1/2 in. from side edges of the board. End joints secured to both resilient/furring channels as shown in end joint detail. When **Steel Framing Members** (Item 6B or 6C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.
CGC INC — Types C, IP-X2, IPC-AR

CGC INC — Type ULIX

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG INTERIORS LLC — Types C, IP-X2, IPC-AR

7A. **Gypsum Board* —** For use when Steel Framing Members* (Item 6A) are used - One layer of 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side edges centered over main runners and joints centered over cross tees or channels. Fastened to cross tees or channels with 1 in. long Type S screws bugle-head screws spaced 8 in. OC

with the screws located 4 in. from the mid-span of the cross tee or channel, and 1-1/2 in. from side edges of gypsum panel. Fastened to main runners with 1 in. long Type S bugle-head screws spaced midway between cross tees or channels. End joints of gypsum panels shall be staggered not less than 4 ft OC with adjacent gypsum panels end joints.
CGC INC — Types C, IP-X2, IPC-AR

CGC INC — Type ULIX

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG INTERIORS LLC — Types C, IP-X2, IPC-AR

8. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Last Updated on 2019-11-18

Pei Evaluation Service®

Pei **Evaluation Service®** is an accredited **ISO Standard 17065** Product Certifier, accredited by the IAS. This **Product Evaluation Report** represents a product that *Pei* **ES** has Evaluated. This product has a Product Evaluation Service Agreement & Follow-up Inspection Service Agreement. This **Product Evaluation Report** in no way implies warranty for this product or relieves **United States Gypsum Company** of their liabilities for this product. This **PER** is an official document if it is within one year of the Initial or Re-Approval date.

PER-13067

Initial Approval	Re-Approved
October, 2013	July, 2019

See all Pei **ES** *Reports at: www.p-e-i.com*

Report Owner

United States Gypsum Company
700 North Highway 45
Libertyville, IL 60048

Product

USG Structural Panel Concrete Subfloor

(a.k.a. 3/4" STRUCTO-CRETE® Structural Concrete Panels)

Approved Manufacturing Locations

USG Structural Technologies, LLC
309 Hallberg Street
Delavan, WI 53115

For Evaluation Report Questions

USG Contact: Manny Hurtado, Building Codes Manager
Phone: 847-970-5179
Email: mhurtado@usg.com

General Details

The approved manufacturing plant has an approved Q.C. Manual to manufacture **USG** Structural Panel Concrete Subfloor and is audited quarterly by *Progressive Engineering Inc.* **USG** Structural Panel Concrete Subfloor is also known as 3/4" STRUCTO-CRETE® Structural Concrete Panels, and the contents of this **PER** are applicable to both product names.

Product Description

USG Structural Panel Concrete Subfloor is a noncombustible concrete sheathing panel used in conjunction with cold-formed steel, wood, or hot-rolled steel framing to form a load bearing structural floor or wall system. **USG** Structural Panel Concrete Subfloor is a nominal 3/4" [19mm] thick x 4' [1220mm] wide x 8' [2440mm] long. The floor panels have a Tongue and Groove edge along the 8' [2440mm] sides and the wall panels are square edged. The panels have a maximum weight of 5.3psf [25.9 kg/m^2] from the manufacturing plant. The panels are a composite material consisting of alkali-resistant fiberglass and a cementitious binder.

USG Structural Panel Concrete Subfloor are noncombustible per ASTM E136 (CAN CSA S114) and have a mold resistance value of no less than 10 per ASTM D3273 and a rating of 1 or less per ASTM G21. This products have also been shown to be termite resistant when tested in accordance with AWPA Standard E1-13 exposure C, and comply with the VOC emission requirements of the California Department of Public Health CDPH/EHLB/Standard Method Version 1.1 (Emission testing method for CA Specification 01350).

Product Application

USG Structural Panel Concrete Subfloor is used as a single floor or as the subfloor (Concrete Subfloor) in conjunction with an underlayment to form a structural floor system to resist gravity loading, floor diaphragm loading and concentrated loading as typically found in Residential and Commercial Type I or Type II Construction. Product may also be used in wall applications in accordance with Table 8 and Table 9.

Framing

Cold-formed steel framing shall comply with AISI and have minimum yield strength of 50 ksi [345 MPa], minimum 18 ga. [40mil] or 0.0403" [1.0236mm] thickness, and minimum G60 galvanized coating. Member flanges must have a minimum width of 1-5/8" [41.27mm]. As an alternative, SPF lumber, 1/8" [3mm] or 1/4" [6mm] steel framing may also be used in conjunction with the fasteners and edge distance listed in Table 2. Typical frame spacing ranges from 12" o.c. [305mm] to 24" o.c. [610mm] for floors. See Table 4 and Table 5 for floor diaphragm shear design values.

Compliance

International Residential Code		International Building Code		City of Los Angeles Building Code (LABC)		California Building Code	
2012 -	Section R301.1.3 Section R301.7	2012 -	Section 703.5.1 Section 703.5.2 Section 1607.1 (Table) Section 1607.4	2017	Chapters 16 & 17 (As applicable)	2019	Section 703.5.1 Section 703.5.2 Table 1607.1 Section 1607.3 & 1607.4
2015 -	Section R301.1.3 Section R301.7 Section R302.6						
2018 -	Section R301.1.3 Section R301.7	2015	Section 703.5.1 Section 703.5.2 Section 1607.1 (Table) Section 1607.3 & 1607.4	**City of Los Angeles Residential Code (LARC)**		**California Residential Code**	
		2018	Section 703.5.1 Section 703.5.2 Section 1607.1 (Table) Section 1607.3 & 1607.4	2017	Section R301.1.3	2019	Section R301.1.3 Section R301.7

- Meets or exceeds the requirements of ICC-ES AC 318 Structural Cementitious Floor Sheathing Panels, Effective July 1, 2009.
- Meets or exceeds the requirements of ICC-ES AC 319 Horizontal Diaphragms Consisting of Structural Cementitious Floor Sheathing Panels Attached to Cold-formed Steel Framing—Approved June 2005, Editorially Revised January 2012.
- Meets the requirements of Table R301.7 Allowable Deflection of Structural Members for Joist Spacing of 24" [610mm] o.c. per the 2012, 2015 & 2018 IRC.

Compliance Continued

• Meets or exceeds the requirements for noncombustible core in accordance with Section 703.5.1 of the 2012, 2015 & 2018 IBC.
• Meets or exceeds the requirements for materials having a structural base of noncombustible material when tested in accordance with ASTM E 136 as defined in 2012, 2015 & 2018 IBC Section 703.5.2 and CAN CSA S114.
• Meets the requirements of Section R301.1.3 Engineered Design for otherwise conventional construction for buildings per the 2012, 2015 & 2018 IRC.
• Meets the requirements of Section R301.1.3 Engineered Design for otherwise conventional construction for buildings per the 2019 California Residential Code.
• For Canadian applications suitability needs to be reviewed by Architect or Engineer of record prior to use.
• Meets or exceeds the requirements of the 2012, 2015 & 2018 IBC Table 1607.1, 2012 Ontario Building Code Table 4.1.5.9 and the 2019 California Building Code; Minimum Uniformly Distributed Live Loads and Minimum Concentrated Live Loads, when installed per manufacturer's instructions.
• Surface Burning Characteristics - Flame Spread Index of 0 / Smoke Development Index of 0 or less when tested in accordance with ASTM E 84.
• Meets & exceeds requirements for concentrated load per ICC AC318 when tested in accordance with ASTM E661 using a 1" [25mm] and 3" [76mm] loading diameter for Wet & Dry conditions.
• Meets and exceeds the requirements of the 2012, 2015 & 2018 IBC and the 2019 California Building Code Section 1607.3 Uniform live loads and Section 1607.4, Concentrated Live Load of 2,000 Lbs.
• Meets or exceeds the 2017 City of Los Angeles Building Code (LABC) - The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 & 17, as applicable.
• Meets or exceeds the requirements of the 2017 Los Angeles Residential Code (LARC) - Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

General Product Installation

1. **USG** Structural Panel Concrete Subfloor is to be installed and maintained during construction following this report and the USG installation instructions. Installation instructions must be made easily available to the product installer.

2. When cutting **USG** Structural Panel Concrete Subfloor, safety glasses and a NIOSH approved N-95 dust mask should be worn at all times due to dust produced by the cutting of this product.

3. Fasteners shall be flush or slightly below the surface and care must be taken to not strip out in the framing. No fastener shall be installed within 2" [51mm] of the corner of a panel and shall not be closer than the minimum distance from panel edges indicated in Table 2 of this **PER**.

4. The tongue and groove joints shall be oriented perpendicular to the framing.

5. The 3/4" [19mm] **USG** Structural Panel Concrete Subfloor is fastened to the cold-formed steel, hot-rolled steel, or wood floor framing with the applicable fasteners indicated in Table 2 of this report.

6. Install panels in a running board pattern bridging a minimum of 2 framing spans. The minimum panel width, measured parallel to the framing, shall be no less than 24" [610mm].

7. Fasteners are applied as shown on the following Screw pattern A, B & C diagrams.

8. Up to a 6" [152mm] x 6" [152mm] cutout through the panels is allowed without blocking. Up to a 44" [1118mm] x 44" [1118mm] cutout is allowed with sufficient blocking around the perimeter of the opening. Larger openings shall be designed by the Engineer of record and are beyond the scope of this report.

9. **USG** Structural Panel Concrete Subfloor must be protected from construction abrasive wear and impact after panel installation until the floor has its final finish applied. Refer to the **USG** Installation Instructions.

10. **USG** Structural Panel Concrete Subfloor must have blocked edges for pabels that are less than 24" wide. The Katz blocking should be fastened through the panel and with the blocking into the joist with a recommended fastener.

Product Storage

USG Structural Panel Concrete Subfloor shall be stored in a dry location. Placement of the palletized product must be on level firm ground or a floor capable of carrying the approximate 3,400 lb. [1545kg] pallet weight. Pallets shall not be stacked more than three high and must be stacked with direct alignment on the pallet below it. If a dry location is unavailable, cover pallets with a waterproof tarp or covering. Sub-freezing temperature may cause the panels to freeze together. Should this happen, move the panels to a warmer location to thaw out. Do not use tools or chemicals to loosen the panels as this will cause damage to the panels and will void the performance ratings described in this **PER**.

Product Labeling

Each bundle shipped of **USG** Structural Panel Concrete Subfloor that are covered by this **PER**, must have a label attached with at least the following information:

1. **USG** Name and Location / Plant Number
2. Date of manufacture
3. This **PER** Number & *Pei* **ES** Logo

Acceptable Evaluation Marks

Table 1: Physical and Mechanical Properties
USG Structural Panel Concrete Subfloor

	Test Standard	Requirements	Tested Values
Concentrated Load, Wet or Dry	ASTM E661	550 lb [2.45 kN] Static 0.108" [2.7 mm] max. deflection @ 200lb [0.89 kN]	804 lb [3.58 kN] Static 0.066" [1.7 mm] max. deflection @ 200lb [0.89 kN]
Fastener Lateral Resistance[1]	ASTM D1761	Dry >210 lb [0.93 kN] Wet >160 lb [0.71 kN]	Dry: 776 lb [3.45 kN] Wet: 800 lb [3.56 kN]
Density - Oven Dried[2]	ASTM C1185	minimun 75 lb/ft^3 [1200 kg/m^3]	78.6 lb/ft^3 [1258 kg/m^3]
Weight, 3/4" [19mm] Thickness as Delivered	ASTM D1037		5.3 lb/ft^2 [25.9 kg/m^2]
pH Value	ASTM D1293		10.5
Linear Variation with Change in Moisture 25% to 90% Relative Humidity	ASTM C1185	<0.10%	0.06%
Thickness Swell	ASTM D1037	≤ 3.0%	0.04%
Freeze/Thaw resistance	ASTM C1185	Minimun of 75% retention of Physical Properties	100% Retention
Mold Resistance	ASTM D3273	10	10
	ASTM G21	≤ 1	≤ 1
Water Absorption[3]	ASTM C1185	<15.0%	9%
Noncombustibility	ASTM E136	Must Pass	Passed
Surface burning Characteristics	ASTM E84	0 Flame Spread / Smoke Developed Index 5	0 Flame Spread / Smoke Developed Index 0
Long Term Durability	ASTM C1185	min. 75% retention of physical properties	100%
Water Durability	ASTM C1185	min. 70% retention of physical properties	83%
Water Vapor Transmission (Method B)	ASTM E96		Permeance 1.4 Perm

Notes:
1. Fastener Lateral Resistance measured with applicable fasteners in Table 2.
2. Density Measured at Equilibrium Conditioning per Section 5.2.3.1-Tested 28 days after manufacturing
3. Absorption Measured from Equilibrium Conditioning followed by immersion in Water for 48 hours

Table 2: Acceptable Diaphragm Fasteners[1]
USG Structural Panel Concrete Subfloor

Minimum Framing	Minimum Edge Distance	Manufacturer	Part No.	Type
16ga [1.438mm] Cold-Formed Steel	1/2" [13mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" winged self-drilling screw
		Simpson Strong-Tie Company, Inc.	CBSDQ158S	#8 x 1-5/8" winged self-drilling screw
18ga [1.0236mm] Cold-Formed Steel	1" [25mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" winged self-drilling screw
1/8" Hot Rolled Steel min. 50 ksi	1" [25mm]	Aerosmith	5324HPG	.145" dia. x 1-1/4" lg. power actuated fastener
		Hilti	X-U 32MX	.157" dia. x 1-1/4" lg. power actuated fastener
		Grabber Construction Products, Inc.	CC12250LRG	#12 x 2-1/2" winged self-drilling screw
		DeWalt	50458-PWR	.157" dia. x 1-1/4" lg. power actuated fastener
1/4" A36 Hot Rolled Steel	3/4" [19mm]	Grabber Construction Products, Inc.	CC12250LRG	#12 x 2-1/2" winged self-drilling screw
		Muro North America	RSM645	M6 x 45mm winged self-drilling screw
		Simpson Strong-Tie Company, Inc.	TBG1260S	#12 x 2-3/8", Flat Head, Strong-Drive® TB WOOD-TO-STEEL screw
SPF Lumber (Min. S.G. = 0.42)	5/8" [16mm]	Grabber Construction Products, Inc.	C8200L2M	#8 x 2", Flat Head, Type 17, Nibs, GrabberGard,
		Simpson Strong-Tie Company, Inc.	WSNTLG2S	#8 x 2", Flat Head,Twin threads, Nibs
	1/2" [13mm]	Senco[2]	GL24AABF	8d Ring Shank Nails

Notes:
1. Fastener pull-through capacity of 581-lbs [2584N] may be applied to all listed fasteners. Capacity is based on **ultimate tested value** for all tabulated fasteners. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).
2. Senco 8d ring shank nails are manufactured with a length of 2-3/8" [60mm], a head diameter of 0.266" [6.8mm], and a shank diameter of 0.113" [2.9mm]. Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of
3. Screw lengths shown are minimums

Floor Usage

Table 3: Uniform Live Load Performance Rating[2]

USG Structural Panel Concrete Subfloor

Span Rating	Conditions	Live Load Rating[1] (PSF)
12" [305mm]	Dry or Wet	512 [24.5 kPa]
16" [406mm]	Dry or Wet	283 [13.5 kPa]
24" [610mm]	Dry or Wet	120 [5.7 kPa]

Notes:

1. Live load ratings have been determined from testing based upon a minimum 120 psf [5.7 Kpa] service live load for the 24" [610mm] span rating and a maximum panel live load deflection = L/360. A factor of safety of 3.0 applied.

2. A minimum of two framing spans required per panel piece.

3. Tabulated live load ratings are valid for a service level dead load of 10 psf [0.5 Kpa] or less.

Table 4 - Safety Factors and Resistance Factors for Diaphragms

USG Structural Panel Concrete Subfloor

Framing Type	Fastener Type	Earthquake			Wind		
		Ω (ASD)	ϕ (LRFD)	ϕ (LSD)[4]	Ω (ASD)	ϕ (LRFD)	ϕ (LSD)[4]
Steel[1]	Screws	2.50	0.65	0.60	2.35	0.70	0.65
Wood[2,3]	Screws or Nails	3.30	0.50	--	2.35	0.70	--

Notes:

1. **Tabulated values have been evaluated for horizontal diaphragm use only.**

2. Safety factors and resistance factors for USG Structural Panel Concrete Subfloor diaphragms installed over cold-formed and hot-rolled steel framing are based upon Table D5 of AISI S100-2007.

3. Safety factors and resistance factors for USG Structural Panel Concrete Subfloor diaphragms installed over wood studs are based on the worst case of the standard factors from the American Wood Council Special Design Provisions for Wind and Seismic (AWC SDPWS-2008) and those tabulated for steel framing.

4. Earthquake factors for installations over wood construction are based upon the wind factors modified by a factor of 1.4 to match the general seismic strength reduction observed in Tables 4.2A, 4.2B, 4.2C, and 4.2D of AWC SDPWS-2008.

5. Limit States Design (LSD) shall be used in combination with the load combinations found in the National Building Code of Canada (NBCC).

Table 5: Simple Beam Diaphragm Testing

USG Structural Panel Concrete Subfloor

Fastener Spacing		Joist Spacing	Screw Pattern[2,3]	Panel Blocking	S_u - Ultimate Shear Strength (plf)	X	Aspect Ratio
Perimeter	Field						
4" [102mm]	**12"** [305mm]	**16"** [407mm]	B	None	1462 [21.3 kN/m]	0.443	3:1
6" [152mm]					1395 [20.4 kN.m]	0.421	
4" [102mm]	**12"** [305mm]	**24"** [610mm]	B	None	1341 [19.6 kNm]	0.476	3:1
6" [152mm]					1053 [15.4 kNm]	0.397	
6" [152mm]	**12"** [305mm]	**24"** [610mm]	C	4" [102mm] wide x 16ga. [1.438mm] Strap	1468 [21.4 kNm]	0.180	4:1

Notes:

1. **Refer to Table 4 of this PER for applicable diaphragm safety (Ω) and load resistance (ϕ) factors corresponding to ASD, LRFD, and/or LSD design methods.**

2. **Screw Pattern B** - Panel fasteners must be inset 2" [51mm] from the corners. Fastener edge distance at all panel edges must comply with distances in Table 2, as well as exception to the tongue and groove joints where the framing joists are perpendicular to the joint. The fasteners should be kept flush or slightly below the surface of the panel. At the T&G panel joists where the framing joists are perpendicular to the joint, one (1) panel fastener is required. One fastener should be 1" [25mm] and the other 2" [51mm] from the panel edge.

3. **Screw Pattern C** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 6" [152mm] o.c. along the metal Strap Blocking on both sides of seam .

Deflection Equation for Simple Beam Diaphragm

$$\Delta = \frac{5Vl^3}{8EAb} + \frac{Vl}{4Gt} + Xle_n$$

Where: V = Unit shear in the direction under consideration, plf

ℓ = Diaphragm length, ft.

b = Diaphragm width, ft.

E = Elastic modulus of steel rim chords, 29,500,000psi

A = Net area of steel rim chord cross section, in^2

G = Shear modulus of **USG** Structural Panel Concrete Subfloor for shear, 285,714 psi

t = Effective thickness of **USG** Structural Panel Concrete Subfloor for shear, 0.73 in.

e_n = Screw joint slippage at load per screw on perimeter of interior panel

e_n @ $0.20S_u$ = 0.011

e_n @ $0.33S_u$ = 0.019

e_n @ $0.60S_u$ = 0.032

e_n @ S_u = 0.084

X = Slip Co-efficient. See Table 5 above.

Table 6: Cantilever Floor Diaphragm Testing

USG Structural Panel Concrete Subfloor

Fastener Spacing		Joist Spacing	Screw Pattern[3,4]	Panel Blocking	S_u - Ultimate Shear Strength (plf)*	X
Perimeter	Field					
6" [152mm]	12" [305mm]	24" [610mm]	B	None	487 [7.1 kN/m]	0.518
8" [203mm]	12" [305mm]	24" [610mm]	B	None	475 [6.9 kN/m]	0.511
4" [102mm]	12" [305mm]	24" [610mm]	A	None	713 [10.4 kN/m]	0.732
6" [152mm]	12" [305mm]				525 [7.7 kN/m]	0.625
8" [203mm]	12" [305mm]				465 [6.8 kN/m]	0.754
4" [102mm]	12" [305mm]	16" [406mm]	A	None	975 [14.2 kN/m]	0.833
6" [152mm]	12" [305mm]				915 [13.4 kN/m]	0.765
8" [203mm]	12" [305mm]				860 [12.6 kN/m]	0.702
4" [102mm]	12" [305mm]	12" [305mm]	A	None	1121 [16.4 kN/m]	0.759
6" [152mm]	12" [305mm]				940 [13.7 kN/m]	0.541
8" [203mm]	12" [305mm]				772 [11.3 kN/m]	0.484
6" [152mm]	12" [305mm]	24" [610mm]	C	4" [102mm] wide x 16ga. [1.438mm] Strap	1148 [19.8 kN/m]	0.354

Notes:

1. **Refer to Table 4 of this PER for applicable diaphragm safety (Ω) and load resistance (ϕ) factors corresponding to ASD, LRFD, and/or LSD design methods.**

2. 2 to 1 maximum Aspect Ratio

3. **Screw Pattern A & B** - Panel fasteners must be inset 2" [51mm] from the corners. Fastener edge distance at all panel edges must comply with Table 2 distances with exception to the tongue and groove joints where the framing joists are perpendicular to the joint. The fasteners should be kept flush or slightly below the surface of the panel. At the T&G panel joists where the framing joists are perpendicular to the joint, two (2) panel fasteners are required for Pattern A and one (1) fastener for Pattern B. One fastener should be 1" [25mm] and the other 2" [51mm] from the panel edge.

4. **Screw Pattern C** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 6" [152mm] o.c. along the metal Strap Blocking on both sides of seam .

Deflection Equation for Cantilever Diaphragm

$$\Delta = \frac{5V(2l)^3}{8EAb} + \frac{V(2l)}{4Gt} + X(2l)e_n$$

Where: V = Unit shear in the direction under consideration, plf

ℓ = Diaphragm length, ft.

b = Diaphragm width, ft.

E = Elastic modulus of steel rim chords, 29,500,000psi

A = Net area of steel rim chord cross section, in^2

G = Shear modulus of **USG** Structural Panel Concrete Subfloor for shear, 285,714 psi

t = Effective thickness of **USG** Structural Panel Concrete Subfloor for shear, 0.73 in.

e_n = Screw joint slippage at load per screw on perimeter of interior panel

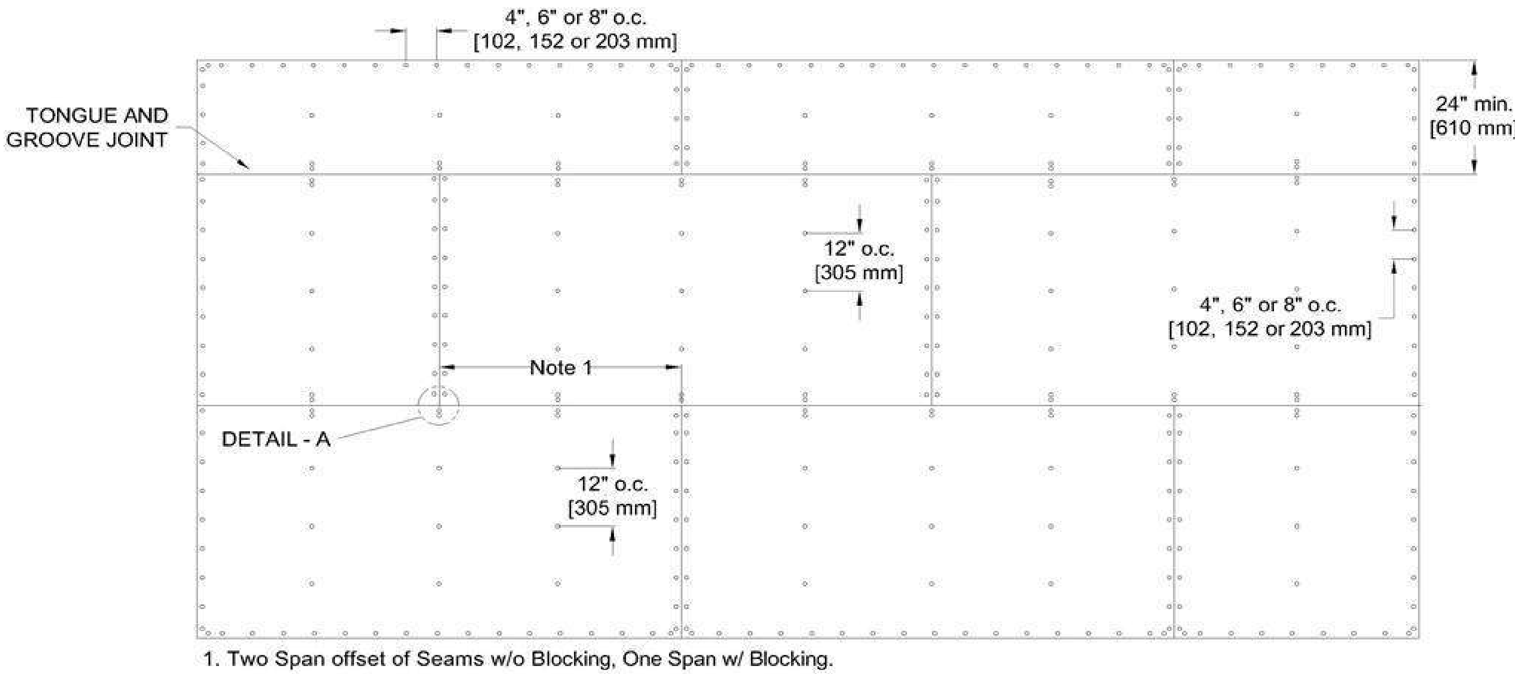
e_n @ $0.20S_u$ = 0.011

e_n @ $0.33S_u$ = 0.019

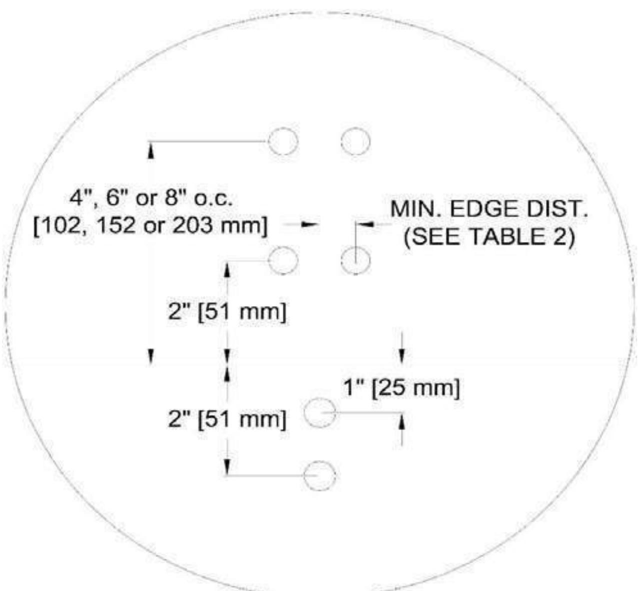
e_n @ $0.60S_u$ = 0.032

e_n @ S_u = 0.084

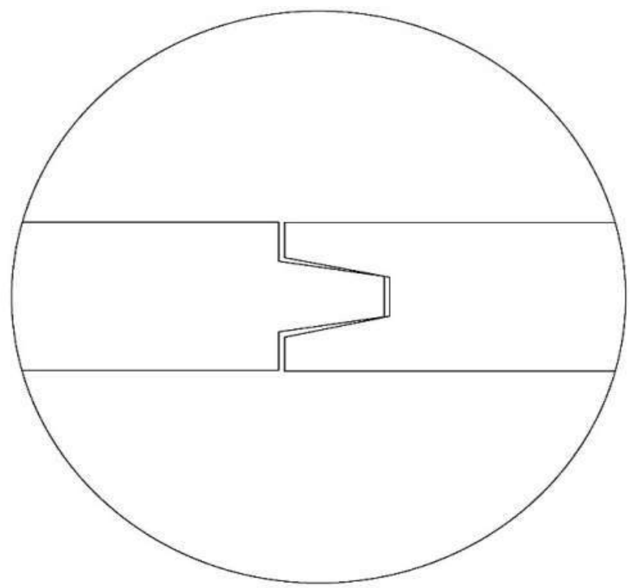
X = Slip Co-efficient. See Table 6 above.



Screw Pattern A

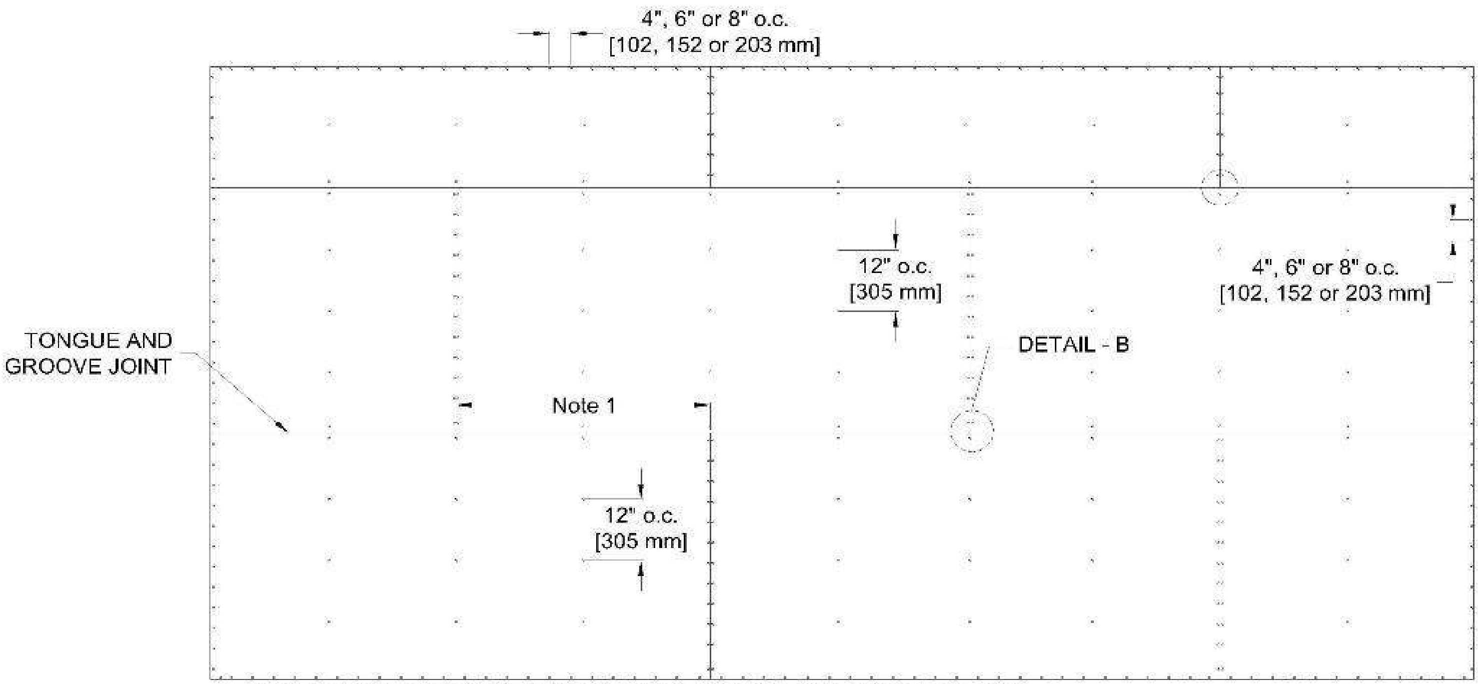


DETAIL - A



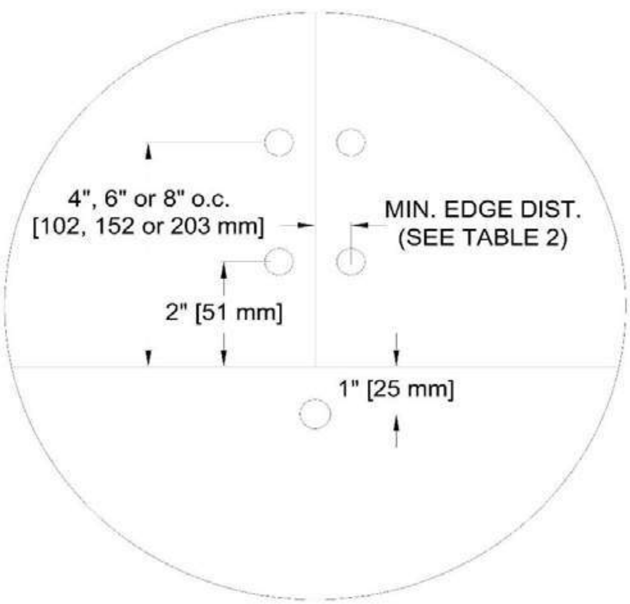
Tongue & Groove

Figure 1 - Screw Pattern "A" Details

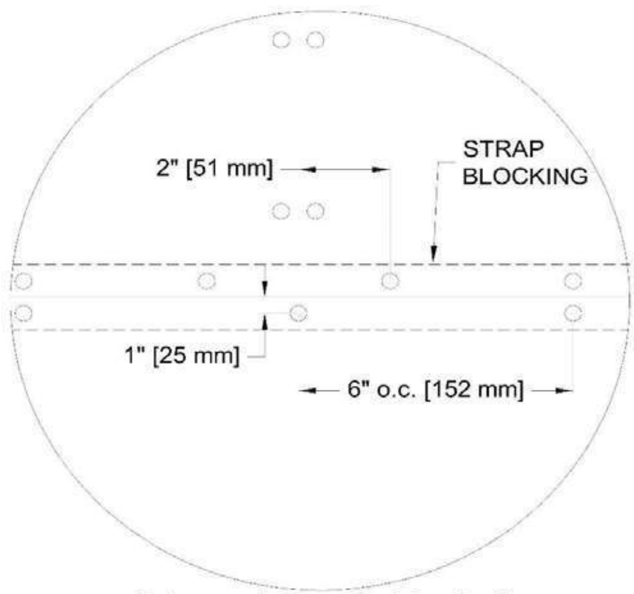


1. Two Span Minimum offset of Seams w/o Blocking, One Span offset w/ Blocking.

Screw Pattern B



DETAIL -B



Strap Block Detail for Screw Pattern C

Figure 2 - Screw Pattern "B" & "C" Details

Table 7: Floor Anchorage Options - USG Structural Panel Concrete Subfloor[1,2,3]

Nominal Withdrawal Capacities per Anchor

Anchor Type	ASTM D 1037 Value (1 Layer)	Subfloor Layers	Distance Between Bolts, d							
			2"	4"	6"	8"	51mm	102mm	152mm	203mm
3/8" SnapToggle®4	1481 lb [6588 N]	1	927 lb	1072 lb	1154 lb	1166 lb	4124 N	4768 N	5133 N	5187 N
		2	1719 lb*	1719 lb*	1719 lb*	1719 lb*	7646 N*	7646 N*	7646 N*	7646 N*
1/2" SnapToggle®5	1616 lb [7188 N]	1	948 lb	1085 lb	1166 lb	1176 lb	4217 N	4826 N	5187 N	5231 N
		2	1843 lb	2088 lb	2273 lb	2400 lb	8198 N	9287 N	10111 N	10676 N
1/4"x3" Peel Rivet[6]	758 lb [3372 N]	1	636 lb	668 lb	668 lb	668 lb	2829 N	2971 N	2971 N	2971 N

For ASD designs use minimum Ω = 4.0; For LRFD designs use maximum ϕ = 0.40

Notes:

1. TOGGLER Anchor System and peel rivet capacity is based on random anchors purchased from a distributor and have not been evaluated for installations other than that described in Table 7 and Figure 3. This **PER** verifies the **USG** Structural Panel Concrete Subfloor capacity only, and actual toggler anchor capacity without panel failure shall be verified by the engineer or designer of record through the SnapToggle anchor or peel rivet manufacturer.

2. TOGGLER Anchor System shall be installed with a maximum torque setting of 200 in-lb [23 N-m].

3. Anchors have been evaluated for use general component connections to the **USG** Structural Panel Concrete Subfloor (i.e. auditorium seating, lightweight equipment, etc.). Final application must be reviewed and approved by the engineer or designer of record.

4. TOGGLER Anchor System 3/8" SnapToggle® (Item No. BC) w/ a Grade 8 Hex Head Bolt. Ultimate withdrawal occurred at a maximum tested shear per pair of 232 lb [1032 N] for one-layer and 430 lb [1913 N] for two layers.

5. TOGGLER Anchor System 1/2" SnapToggle® (Item No. BD) w/ a Grade 5 Hex Head Bolt. Ultimate withdrawal occurred at a maximum tested shear per pair of 294 lb [1308 N] for one-layer and 600 lb [2669 N] for two layers.

6. Peel Rivets manufactured by SFS Intec (Part No. TPR-L-6, 3x76). Ultimate withdrawal occurred at a maximum tested shear per pair of 167 lb [743 N] for a single layer of **USG** Structural Panel Concrete Subfloor.

* Denotes Toggler Failure by Strip out.

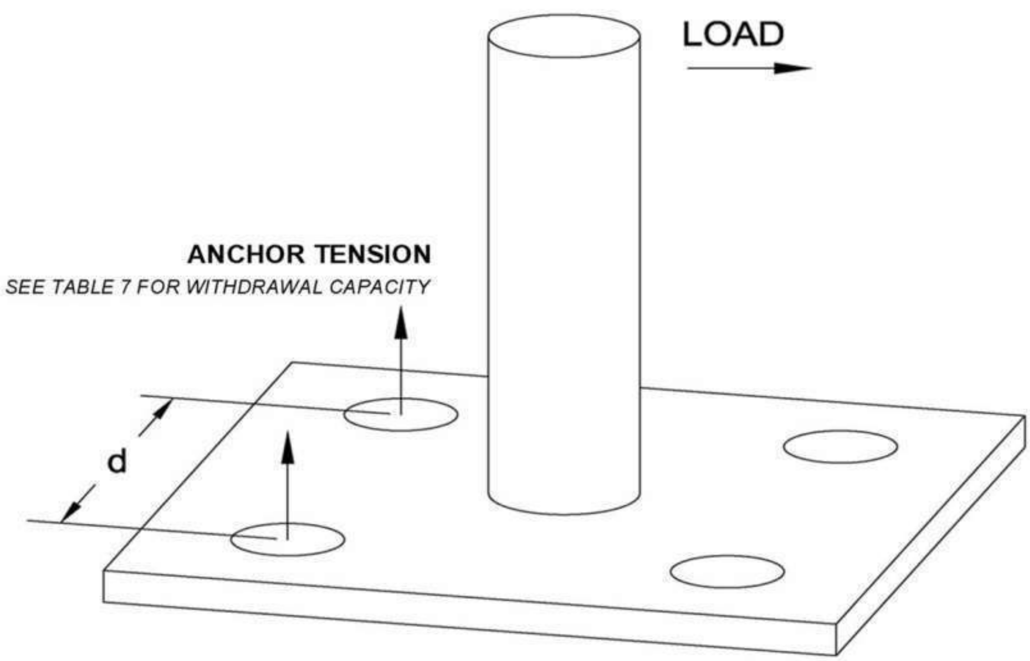


Figure 3 - Typical Toggler Bolt Application

Wall Usage

Table 8

Tested Static Wall Shear Values using 16ga. [54mil] or 0.0538" [1.438mm] X 3-5/8" [92mm] flange Steel Studs **16**" [406mm] o.c.

Sides Sheathed	Strap at Seam	Sheathing Orientation	Fastener Spacing		Ultimate Load in plf	G' Lbs./in	Ultimate Load kN/m	G' N/mm
			Perimeter	Field				
Single	no	Vertical	8" [203mm]	12" [305mm]	914	6185	13.3	1083
Single	no	Vertical	6" [152mm]	12" [305mm]	1320	7416	19.2	1299
Single	no	Vertical	4" [102mm]	12" [305mm]	1726	8647	25.1	1514
Single	yes	Horizontal	8" [203mm]	12" [305mm]	984	5535	14.3	969
Single	yes	Horizontal	6" [152mm]	12" [305mm]	1402	7269	20.4	1273
Single	yes	Horizontal	4" [102mm]	12" [305mm]	1821	9003	26.5	1577
Double	yes	Horizontal	8" [203mm]	12" [305mm]	1901	13287	27.7	2327
Double	yes	Horizontal	6" [152mm]	12" [305mm]	2625	22677	38.2	3971
Double	yes	Horizontal	4" [102mm]	12" [305mm]	3349	32067	48.8	5616

Note:

1. The Ultimate Load does not include a safety factor and walls have not been evaluated for cyclic design loads.

Table 9

Tested Static Wall Shear Values using 16ga. [54mil] or 0.0538" [1.438mm] X 3-5/8" [92mm] flange Steel Studs **24**" [610mm] o.c.

Sides Sheathed	Strap at Seam	Sheathing Orientation	Fastener Spacing		Ultimate Load in plf	G' Lbs./in	Ultimate Load kN/m	G' N/mm
			Perimeter	Field				
Single	no	Vertical	8" [203mm]	12" [305mm]	819	5882	11.9	1030
Single	no	Vertical	6" [152mm]	12" [305mm]	1201	7736	17.5	1355
Single	no	Vertical	4" [102mm]	12" [305mm]	1584	9590	23.1	1679
Single	yes	Horizontal	8" [203mm]	12" [305mm]	906	5117	13.2	896
Single	yes	Horizontal	6" [152mm]	12" [305mm]	1292	7384	18.8	1293
Single	yes	Horizontal	4" [102mm]	12" [305mm]	1679	9590	24.5	1679
Double	yes	Horizontal	8" [203mm]	12" [305mm]	1730	11684	25.2	2046
Double	yes	Horizontal	6" [152mm]	12" [305mm]	2432	19945	35.4	3493
Double	yes	Horizontal	4" [102mm]	12" [305mm]	3135	28207	45.7	4940

Note:

1. The Ultimate Load does not include a safety factor and walls have not been evaluated for cyclic design loads.

Pei Evaluation Service

***Pei* Evaluation Service** is an accredited **ISO Standard 17065** Product Certifier, accredited by the IAS. This **Product Evaluation Report** represents a product that ***Pei* ES** has Evaluated. This product has a Product Evaluation Service Agreement & Follow-up Inspection Service Agreement. This **Product Evaluation Report** in no way implies warranty for this product or relieves **United States Gypsum Company** of their liabilities for this product. This **PER** is an official document if it is within one year of the initial or re-approval date.

PER-14076

Initial Approval	Re-Approved
November, 2014	July, 2019

*See all Pei **ES** Reports at: www.p-e-i.com*

Report Owner
United States Gypsum Company
700 North Highway 45
Libertyville, IL 60048

Product
USG Structural Panel Concrete Roof Deck
*(a.k.a. 3/4" **USG** Securock® Concrete Roof Deck Panel)*

Approved Manufacturing Locations
USG Structural Technologies, LLC
309 Hallberg Street
Delavan, WI 53115

For Evaluation Report Questions
USG Contact: Manny Hurtado, Building Codes Manager
Phone: 847-970-5179
Email: mhurtado@usg.com

General Details
The approved manufacturing plant has an approved Quality Control Manual to manufacture **USG** Structural Panel Concrete Roof Deck and is audited quarterly by *Progressive Engineering Inc.* **USG** Structural Panel Concrete Roof Deck is also known as 3/4" **USG** Securock® Concrete Roof Deck Panels, and the contents of this **PER** are applicable to both product names.

Product Description
USG Structural Panel Concrete Roof Deck is a noncombustible concrete sheathing panel used in conjunction with cold-formed steel, wood, or hot rolled steel framing to form a load bearing structural roof system. **USG** Structural Panel Concrete Roof Deck is a nominal 3/4" [19mm] thick x 4' [1220mm] wide x 8' [2440mm] long. Roof deck panels have either a Tongue and Groove edge along the 8' [2440mm] sides or square edge. Panels are manufactured from a composite material consisting of alkali-resistant fiberglass and a cementitious binder, which create a maximum panel weight of 5.3psf [25.9 kg/m2] from the manufacturing plant.

USG Structural Panel Concrete Roof Deck are noncombustible per ASTM E136 (CAN CSA S114) and have a mold resistance value of no less than 10 per ASTM D3273 and a rating of 1 or less per ASTM G21. These panel products have also been shown to be termite resistant when tested in accordance with AWPA Standard E1-13 exposure C, and comply with the VOC emission requirements of the California Department of Public Health CDPH/EHLB/Standard Method Version 1.1 (Emission testing method for CA Specification

Product Application
USG Structural Panel Concrete Roof Deck is used as a roof deck sheathing to form a structural roof system to resist gravity loading, roof deck loading and concentrated loading as typically found in Residential and Commercial Type I or Type II Construction.

Roof Framing
Roof framing must be Cold-formed 50 ksi [345 MPa] steel framing complying with AISI and a minimum thickness of 18 ga. [40mil] or 0.0403" [1.0236mm] with a minimum G60 galvanized coating. Joist flanges supporting the **USG** Structural Panel Concrete Roof Deck must have a minimum width of 1-5/8" [41.27mm]. Roof frame spacing shall be no greater than 48" o.c. [1219mm]. As an alternative, SPF lumber, 1/8" [3mm] or 1/4" [6mm] steel framing may also be used in conjunction with the fasteners and edge distance listed in

Compliance

<table>
<tr><th colspan="2">International Residential Code</th><th colspan="2">International Building Code</th><th colspan="2">City of Los Angeles Building Code (LABC)</th><th colspan="2">California Building Code</th></tr>
<tr><td>2012 -</td><td>Section R301.1.3</td><td rowspan="2">2012 -</td><td rowspan="2">Section 703.5.1
Section 703.5.2
Section 1607.4</td><td rowspan="2">2017</td><td rowspan="2">Chapters 16 & 17
(As applicable)</td><td rowspan="3">2019</td><td rowspan="3">Section 703.5.1
Section 703.5.2
Section 1607.3
Section 1607.4</td></tr>
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Section R302.6</td></tr>
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Section 703.5.2
Section 1607.4</td><td colspan="2">City of Los Angeles Residential Code (LARC)</td></tr>
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<tr><td></td><td></td><td>2018 -</td><td>Section 703.5.1
Section 703.5.2
Section 1607.3
Section 1607.4</td><td>2019</td><td>Section R301.1.3</td></tr>
</table>

- Meets or exceeds the requirements of ICC-ES AC 318 Structural Cementitious Floor & Roof Sheathing Panels, Effective July 1, 2009.
- Meets or exceeds the requirements of ICC-ES AC 319 Horizontal Diaphragms Consisting of Structural Cementitious Floor Sheathing Panels Attached to Cold-formed Steel Framing—Approved June 2005, Editorially Revised January 2012.
- Meets the requirements of Table R301.7 "Allowable Deflection of Structural Members" for Joist Spacing of 48" o.c. [1219mm] using L/240 per the 2012 & 2015 IRC.
- Meets or exceeds the requirements for noncombustible core in accordance with Section 703.5.1 of the 2012, 2015 & 2018 IBC.
- Meets or exceeds the requirements for materials having a structural base of noncombustible material when tested in accordance with ASTM E 136 as defined in 2012, 2015 & 2018 IBC, 2019 California Building Code Section 703.5.2. and CAN CSA S114.
- Meets or exceeds the nail withdrawal requirements of Table 6 of APA PS-2 for use as a roof sheathing.

Compliance Continued

• For Canadian applications suitability needs to be reviewed by Architect or Engineer of record prior to use.

• Meets the requirements of Section R301.1.3 Engineered Design for otherwise conventional construction for buildings per the 2012, 2015 & 2018 IBC and the 2019 California Residential Code.

• Surface Burning Characteristics - Flame Spread Index of 0 / Smoke Development Index of 0 when tested in accordance with ASTM E84.

• Meets & exceeds requirements for concentrated load per ICC AC318 when tested in accordance with ASTM E661 using a 1" [25mm] and 3" [76mm] loading diameter for Wet & Dry conditions.

• Meets or exceeds the 2017 City of Los Angeles Building Code (LABC) - The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 & 17, as applicable.

• Meets or exceeds the requirements of the 2017 Los Angeles Residential Code (LARC) - Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

General Product Installation

1. **USG** Structural Panel Concrete Roof Deck is to be installed and maintained during construction following this report and the USG installation instructions. Installation instructions must be made easily available to the product installer.
2. **USG** Structural Panel Concrete Roof Deck must be allowed to acclimate to job site conditions for a minimum of 48 hours.
3. When cutting **USG** Structural Panel Concrete Roof Deck, safety glasses and a NIOSH approved N-95 dust mask should be worn at all times due to dust produced by the cutting of this product.
4. Fasteners shall be flush or slightly below the surface and care must be taken to not strip out in the framing. No fastener shall be installed within 2" [51mm] of the corner of a panel and shall not be closer than the minimum distance from panel edges indicated in Table 2 of this **PER**.

Product Installation for Roof Applications

1. The tongue and groove joints shall be oriented perpendicular to the framing.
2. The 3/4" [19mm] **USG** Structural Panel Concrete Roof Deck is fastened to the cold-formed steel, hot rolled steel, or wood framing with the applicable fasteners indicated in Table 2.
3. Install panels in a running bond pattern bridging a minimum of 2 framing spans. The minimum panel width, measured parallel to the framing, shall be no less than 48" [1219mm].
4. Fasteners are applied as shown in the Screw Pattern A, B, C, D, or E diagrams, on pages seven (7) and eight (8) of this report.
5. Up to a 6" [152mm] x 6" cutout through the panels is allowed without blocking. Up to a 44" [1118mm] x 44" [1118mm] cutout is allowed with sufficient blocking around the perimeter of the opening. Larger openings shall be designed by the Engineer of record and are beyond the scope of this report.
6. **USG** Structural Panel Concrete Roof Deck must be protected from construction abrasive wear and impact after panel installation until the final roof covering is applied. Refer to the USG Installation Instructions.

Product Storage

USG Structural Panel Concrete Roof Deck shall be stored in a dry location. Placement of the palletized product must be on level firm ground or a floor capable of carrying the approximate 3,400 lbs. [1545kg] pallet weight. Pallets shall not be stacked more than three high and must be stacked with direct alignment on the pallet below it. If a dry location is unavailable, cover pallets with a waterproof tarp or covering. Sub-freezing temperature may cause the panels to freeze together. Should this happen, move the panels to a warmer location to thaw out. Do not use tools or chemicals to loosen the panels as this will cause damage to the panels and will void the performance ratings described in this **PER**.

Product Labeling

Each bundle shipped of **USG** Structural Panel Concrete Roof Deck that is covered by this **PER**, must have a label attached with at least the following information:

1. **USG** Name and Location / Plant Number
2. Date of manufacture
3. This **PER** Number & *Pei* **ES** Logo

Acceptable Evaluation Marks

Table 1: Physical and Mechanical Properties
USG Structural Panel Concrete Roof Deck

	Test Standard	Requirements	Tested Values
Concentrated Load, Wet or Dry	ASTM E661	550 lb [2.45 kN] Static 0.108" [2.7 mm] max. deflection @ 200lb [0.89 kN]	804 lb [3.58 kN] Static 0.066" [1.7 mm] max. deflection @ 200lb [0.89 kN]
Fastener Lateral Resistance[1]	ASTM D1761	Dry >210 lb [0.93 kN] Wet >160 lb [0.71 kN]	Dry: 776 lb [3.45 kN] Wet: 800 lb [3.56 kN]
Density - Oven Dried[2]	ASTM C1185	minimun 75 lb/ft^3 [1200 kg/m^3]	78.6 lb/ft^3 [1258 kg/m^3]
Weight, 3/4" [19mm] Thickness as Delivered	ASTM D1037		5.3 lb/ft^2 [25.9 kg/m^2]
pH Value	ASTM D1293		10.5
Linear Variation with Change in Moisture 25% to 90% Relative Humidity	ASTM C1185	<0.10%	0.06%
Thickness Swell	ASTM D1037	≤ 3.0%	0.04%
Freeze/Thaw resistance	ASTM C1185	Minimun of 75% retention of Physical Properties	100% Retention
Mold Resistance	ASTM D3273	10	10
	ASTM G21	≤ 1	≤ 1
Water Absorption[3]	ASTM C1185	<15.0%	9%
Noncombustibility	ASTM E136	Must Pass	Passed
Surface burning Characteristics	ASTM E84	0 Flame Spread / Smoke Developed Index 5	0 Flame Spread / Smoke Developed Index 0
Long Term Durability	ASTM C1185	min. 75% retention of physical properties	100%
Water Durability	ASTM C1185	min. 70% retention of physical properties	83%
Water Vapor Transmission (Method B)	ASTM E96		Permeance 1.4 Perm

Notes:
1. Fastener Lateral Resistance measured with applicable fasteners in Table 2.
2. Density Measured at Equilibrium Conditioning per Section 5.2.3.1-Tested 28 days after manufacturing
3. Absorption Measured from Equilibrium Conditioning followed by immersion in Water for 48 hours

Table 2: Acceptable Diaphragm Fasteners[1]
USG Structural Panel Concrete Roof Deck

Minimum Framing	Minimum Edge Distance	Manufacturer	Part No.	Type
16ga [1.438mm] Cold-Formed Steel	1/2" [13mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" winged self-drilling screw
		Simpson Strong-Tie Company, Inc.	CBSDQ158S	#8 x 1-5/8" winged self-drilling screw
18ga [1.0236mm] Cold-Formed Steel	1" [25mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" winged self-drilling screw
1/8" Hot Rolled Steel min. 50 ksi	1" [25mm]	Aerosmith	5324HPG	.145" dia. x 1-1/4" lg. power actuated fastener
		Hilti	X-U 32MX	.157" dia. x 1-1/4" lg. power actuated fastener
		Grabber Construction Products, Inc.	CC12250LRG	#12 x 2-1/2" winged self-drilling screw
		DeWalt	50458-PWR	.157" dia. x 1-1/4" lg. power actuated fastener
1/4" A36 Hot Rolled Steel	3/4" [19mm]	Grabber Construction Products, Inc.	CC12250LRG	#12 x 2-1/2" winged self-drilling screw
		Muro North America	RSM645	M6 x 45mm winged self-drilling screw
		Simpson Strong-Tie Company, Inc.	TBG1260S	#12 x 2-3/8", Flat Head, Strong-Drive® TB WOOD-TO-STEEL screw
SPF Lumber (Min. S.G. = 0.42)	5/8" [16mm]	Grabber Construction Products, Inc.	C8200L2M	#8 x 2", Flat Head, Type 17, Nibs, GrabberGard,
		Simpson Strong-Tie Company, Inc.	WSNTLG2S	#8 x 2", Flat Head,Twin threads, Nibs
	1/2" [13mm]	Senco[2]	GL24AABF	8d Ring Shank Nails

Notes:
1. Fastener pull-through capacity of 581-lbs [2584N] may be applied to all listed fasteners. Capacity is based on **ultimate tested value** for all tabulated fasteners. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).
2. Senco 8d ring shank nails are manufactured with a length of 2-3/8" [60mm], a head diameter of 0.266" [6.8mm], and a shank diameter of 0.113" [2.9mm]. Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.
3. Screw lengths shown are minimums

Table 3: Uniform Load Performance

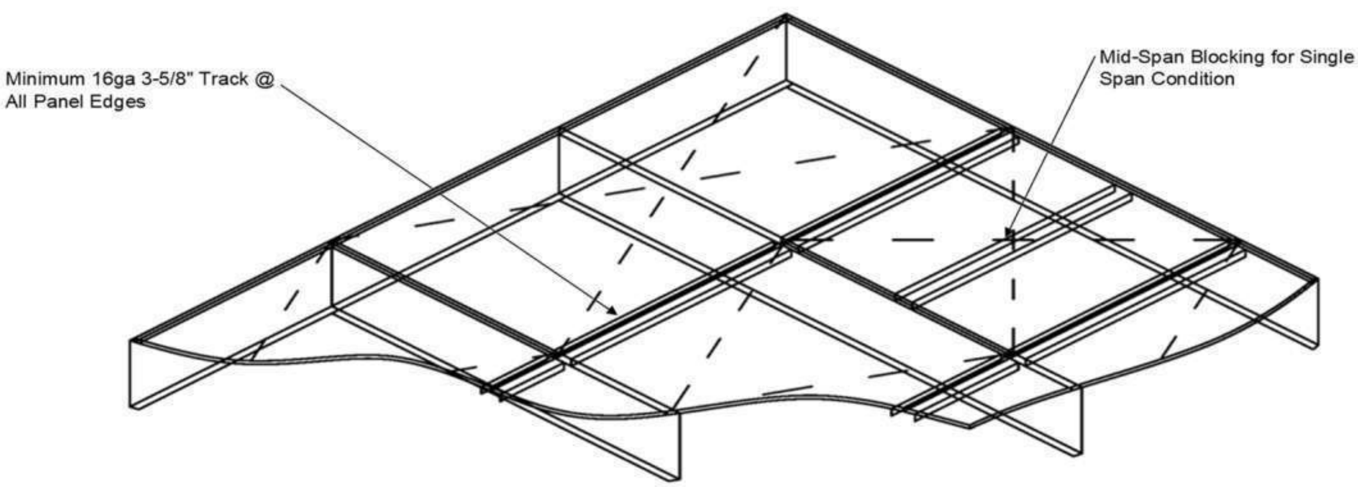
USG Structural Panel Concrete Roof Deck

Span Rating[1]	Conditions	Live Load Rating[2,3] (PSF)	Nominal Uplift Capacity[4] (PSF)			
			8/12	8/8	6/6	4/4
12" [305mm]	Dry or Wet	1320 [63.2 kPa]	513 [24.6 kPa]	770 [36.9 kPa]	1026 [49.1 kPa]	1320 [63.2 kPa]
16" [406mm]	Dry or Wet	744 [35.6 kPa]	385 [18.4 kPa]	577 [27.6 kPa]	744 [35.6 kPa]	744 [35.6 kPa]
24" [610mm]	Dry or Wet	516 [24.7 kPa]	257 [12.3 kPa]	330 [15.8 kPa]	330 [15.8 kPa]	330 [15.8 kPa]
32" * [813mm]	Dry or Wet	240 [11.5 kPa]	192 [9.2 kPa]	240 [11.5 kPa]	240 [11.5 kPa]	240 [11.5 kPa]
48" * [1219mm]	Dry or Wet	150 [7.2 kPa]	128 [6.1 kPa]	150 [7.2 kPa]	150 [7.2 kPa]	150 [7.2 kPa]

Notes:

1. **Two framing spans minimum per panel piece for span ratings of 12" [305mm] through 24" [813mm].**
2. **For ASD designs use minimum Ω = 3.0; For LRFD designs use maximum ϕ = 0.50; For LSD designs use maximum ϕ = 0.40**
3. The Nominal Load values are by engineering analysis based on flexural test results.
4. Nominal uplift capacity based upon the worst case of panel flexure, pull-over of a #8 wafer head screw with a head diameter of 0.306" [7.77mm], and #8 screw withdrawal from minimum 16ga with a minimum yield strength of 50 ksi. Screw nominal withdrawal capacity taken as 513 pounds based on AISI S100 Section E4.

* Blocking at all joints perpendicular to framing to be minimum 16 ga [54mil] or 0.0538" [1.438mm] thick 3-5/8" track. For sheathing installation where a single span condition exists, additional track blocking is required perpendicular to the framing located mid way between the edges of the panel. See Detail 1.



Detail 1 - Blocking Detail for 32"[813mm] & 48"[1219mm] o.c. Span Rating (Isometric View)

Table 4 - Safety Factors and Resistance Factors for Diaphragms

USG Structural Panel Concrete Roof Deck

Framing Type	Fastener Type	Earthquake			Wind		
		Ω (ASD)	ϕ (LRFD)	ϕ (LSD)[4]	Ω (ASD)	ϕ (LRFD)	ϕ (LSD)[4]
Steel[1]	Screws	2.50	0.65	0.60	2.35	0.70	0.65
Wood[2,3]	Screws or Nails	3.30	0.50	--	2.35	0.70	--

Notes:

1. Safety factors and resistance factors for **USG** Structural Panel Concrete Roof Deck diaphragms installed over cold-formed and hot-rolled steel framing are based upon Table D5 of AISI S100-2007.
2. Safety factors and resistance factors for **USG** Structural Panel Concrete Roof Deck diaphragms installed over wood studs are based on the worst case of the standard factors from the American Wood Council Special Design Provisions for Wind and Seismic (AWC SDPWS-2008) and those tabulated for steel framing.
3. Earthquake factors for installations over wood construction are based upon the wind factors modified by a factor of 1.4 to match the general seismic strength reduction observed in Tables 4.2A, 4.2B, 4.2C, and 4.2D of AWC SDPWS-2008.
4. Limit States Design (LSD) shall be used in combination with the load combinations found in the National Building Code of Canada (NBCC).

Table 5: Simple Beam Diaphragm Testing
USG Structural Panel Concrete Roof Deck

Fastener Spacing		Joist Spacing	Screw Pattern[2,3,4,5]	Panel Blocking	S_u Ultimate Strength (plf)[1]	X	Aspect Ratio
Perimeter	Field						
4" [102mm]	**12"** [305mm]	**16"** [406mm]	B	None	1462 [21.3 kN/m]	0.443	3:1
6" [152mm]					1395 [20.4 kN.m]	0.421	
4" [102mm]	**12"** [305mm]	**24"** [610mm]	B	None	1341 [19.6 kNm]	0.476	3:1
6" [152mm]					1053 [15.4 kNm]	0.397	
6" [152mm]	**12"** [305mm]	**24"** [610mm]	C	4" [102mm] wide x 16ga.[1.438mm] Strap	1468 [21.4 kNm]	0.180	4:1
4" [102mm]	**12"** [305mm]	**32" or 48"** [813mm or 1219mm]	D	4" [102mm] wide x 16ga.[1.438mm] C-Track	2036 [29.7 kNm]	0.415	2.1:1
8" [203mm]	**12"** [305mm]	**32" or 48"** [813mm or 1219mm]	E	4" [102mm] wide x 16ga.[1.438mm] C-Track	1318 [19.2 kNm]	0.301	2.1:1

Notes:

1. **Refer to Table 4 of this PER for applicable diaphragm safety (Ω) and load resistance factors (ϕ) corresponding to ASD, LRFD, and/or LSD design methods.**

2. **Screw Pattern B** - Panel fasteners must be inset 2" [51mm] from the corners. Fastener edge distance at all panel edges must comply with Table 2 distances with exception to the tongue and groove joints where the framing joists are perpendicular to the joint. The fasteners should be kept flush or slightly below the surface of the panel. At the T&G panel joints, where the framing joists are perpendicular to the joint, one (1) panel fastener is required. One fastener should be 1" [25mm] from the panel edge.

3. **Screw Pattern C** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 6" [152mm] o.c. along the metal Strap Blocking on both sides of seam .

4. **Screw Pattern D** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 4" [102mm] o.c. along the metal C-Track Blocking on both sides of seam. When framing is spaced at 32" o.c., 4" [102mm] by 16ga. [1.438mm] strap blocking may be used in place of the C-Track blocking.

5. **Screw Pattern E** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 8" [203mm] o.c. along the metal C-Track Blocking on both sides of seam. When framing is spaced at 32" o.c., 4" [102mm] by 16ga. [1.438mm] strap blocking may be used in place of the C-Track blocking.

Deflection Equation for Simple Beam Diaphragm

$$\Delta = \frac{5Vl^3}{8EAb} + \frac{Vl}{4Gt} + Xle_n$$

Where: V = Unit shear in the direction under consideration, plf

ℓ = Diaphragm length, ft.

b = Diaphragm width, ft.

E = Elastic modulus of steel rim chords, 29,500,000psi

A = Net area of steel rim chord cross section, in^2

G = Shear modulus of **USG** Structural Panel Concrete Roof Deck for shear, 285,714 psi

t = Effective thickness of **USG** Structural Panel Concrete Roof Deck for shear, 0.73 in.

e_n = Screw joint slippage at load per screw on perimeter of interior panel

e_n @ $0.20S_u$ = 0.011

e_n @ $0.33S_u$ = 0.019

e_n @ $0.60S_u$ = 0.032

e_n @ S_u = 0.084

X = Slip Co-efficient. See Table 5 above.

Table 6: Cantilever Diaphragm Testing

USG Structural Panel Concrete Roof Deck

Fastener Spacing		Joist Spacing	Screw Pattern[3,4,5,6]	Panel Blocking	S_u Ultimate Strength (plf)[1]	X
Perimeter	Field					
6" [152mm]	12" [305mm]	24" [610mm]	B	None	487 [7.1 kN/m]	0.518
8" [203mm]	12" [305mm]	24" [610mm]	B	None	475 [6.9 kN/m]	0.511
4" [102mm]	12" [305mm]	24" [610mm]	A	None	713 [10.4 kN/m]	0.732
6" [152mm]	12" [305mm]				525 [7.7 kN/m]	0.625
8" [203mm]	12" [305mm]				465 [6.8 kN/m]	0.754
4" [102mm]	12" [305mm]	16" [406mm]	A	None	975 [14.2 kN/m]	0.833
6" [152mm]	12" [305mm]				915 [13.4 kN/m]	0.765
8" [203mm]	12" [305mm]				860 [12.6 kN/m]	0.702
4" [102mm]	12" [305mm]	12" [305mm]	A	None	1121 [16.4 kN/m]	0.759
6" [152mm]	12" [305mm]				940 [13.7 kN/m]	0.541
8" [203mm]	12" [305mm]				772 [11.3 kN/m]	0.484
6" [152mm]	12" [305mm]	24" [610mm]	C	4" [102mm] wide x 16ga.[1.438mm] Strap	1148 [19.8 kN/m]	0.354
4" [102mm]	12" [305mm]	32" or 48" [813mm or 1219mm]	D	4" [102mm] wide x 16ga. [1.438mm] C-Track	1641 [23.9 kN/m]	0.426
8" [203mm]	12" [305mm]	32" or 48" [813mm or 1219mm]	E	4" [102mm] wide x 16ga. [1.438mm] C-Track	1098 [16.0 kN/m]	0.391

Notes:

1. **Refer to Table 4 of this PER for applicable diaphragm safety (Ω) and load resistance factors (φ) corresponding to ASD, LRFD, and/or LSD design methods.**

2. 2 to 1 maximum Aspect Ratio

3. **Screw Pattern A & B** - Panel fasteners must be inset 2" [51mm] from the corners. Fastener edge distance at all panel edges must comply with Table 2 distances with exception to the tongue and groove joints where the framing joists are perpendicular to the joint. The fasteners should be kept flush or slightly below the surface of the panel. At the T&G panel joists where the framing joists are perpendicular to the joint, two (2) panel fasteners are required for Pattern A and one (1) fastener for Pattern B. One fastener should be 1" [25mm] and the other 2" [51mm] from the panel edge.

4. **Screw Pattern C** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 6" [152mm] o.c. along the metal Strap Blocking on both sides of seam .

5. **Screw Pattern D** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 4" [102mm] o.c. along the C-Track Blocking on both sides of seam. When framing is spaced at 32" o.c., 4" [102mm] by 16ga. [1.438mm] strap blocking may be used in place of the C-Track blocking.

6. **Screw Pattern E** - Panels shall be fastened as described in Screw Pattern B with the addition of fasteners at 8" [203mm] o.c. along the C-Track Blocking on both sides of seam. When framing is spaced at 32" o.c., 4" [102mm] by 16ga. [1.438mm] strap blocking may be used in place of the C-Track blocking.

Deflection Equation for Cantilever Diaphragm

$$\Delta = \frac{5V(2l)^3}{8EAb} + \frac{V(2l)}{4Gt} + X(2l)e_n$$

Where: V = Unit shear in the direction under consideration, plf

ℓ = Diaphragm length, ft.

b = Diaphragm width, ft.

E = Elastic modulus of steel rim chords, 29,500,000psi

A = Net area of steel rim chord cross section, in^2

G = Shear modulus of USG Structural Panel Concrete Roof Deck for shear, 285,714 psi

t = Effective thickness of USG Structural Panel Concrete Roof Deck for shear, 0.73 in.

e_n = Screw joint slippage at load per screw on perimeter of interior panel

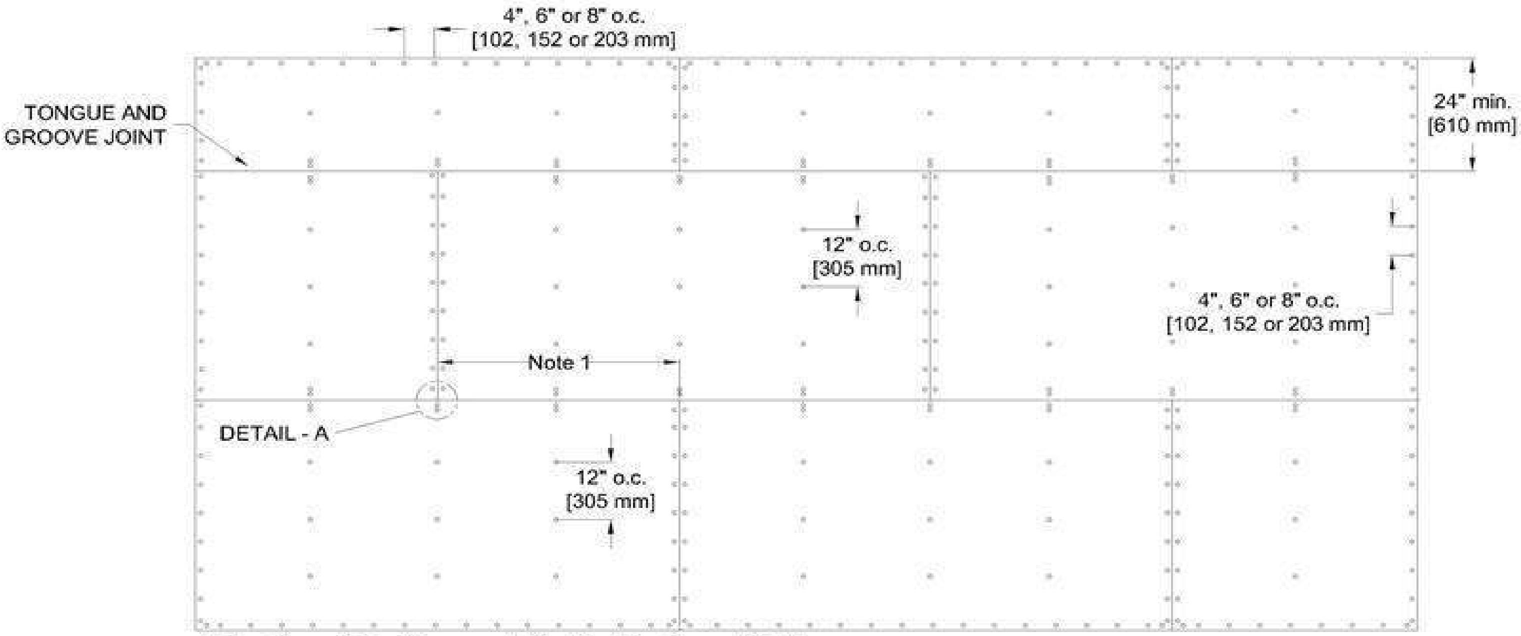
e_n @ $0.20S_u$ = 0.011

e_n @ $0.33S_u$ = 0.019

e_n @ $0.60S_u$ = 0.032

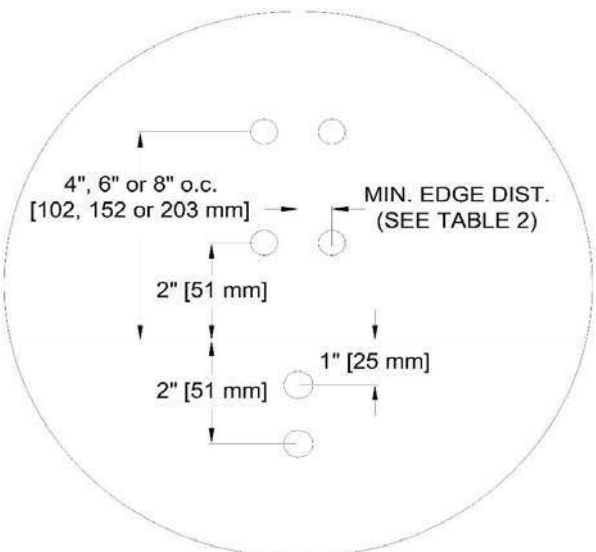
e_n @ S_u = 0.084

X = Slip Co-efficient. See Table 6 above.

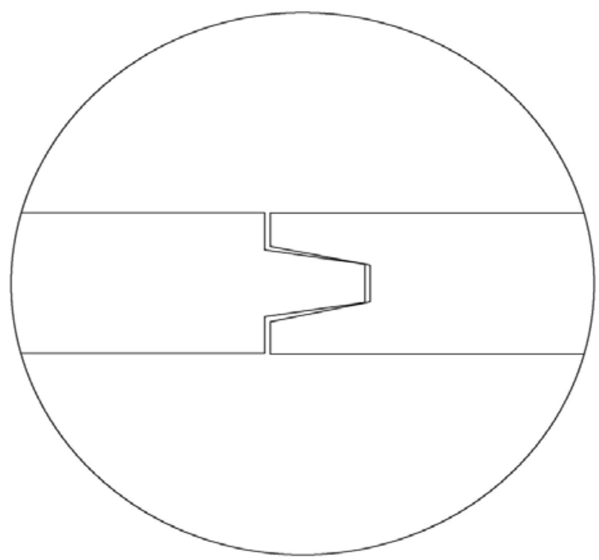


1. Two Span offset of Seams w/o Blocking, One Span w/ Blocking.

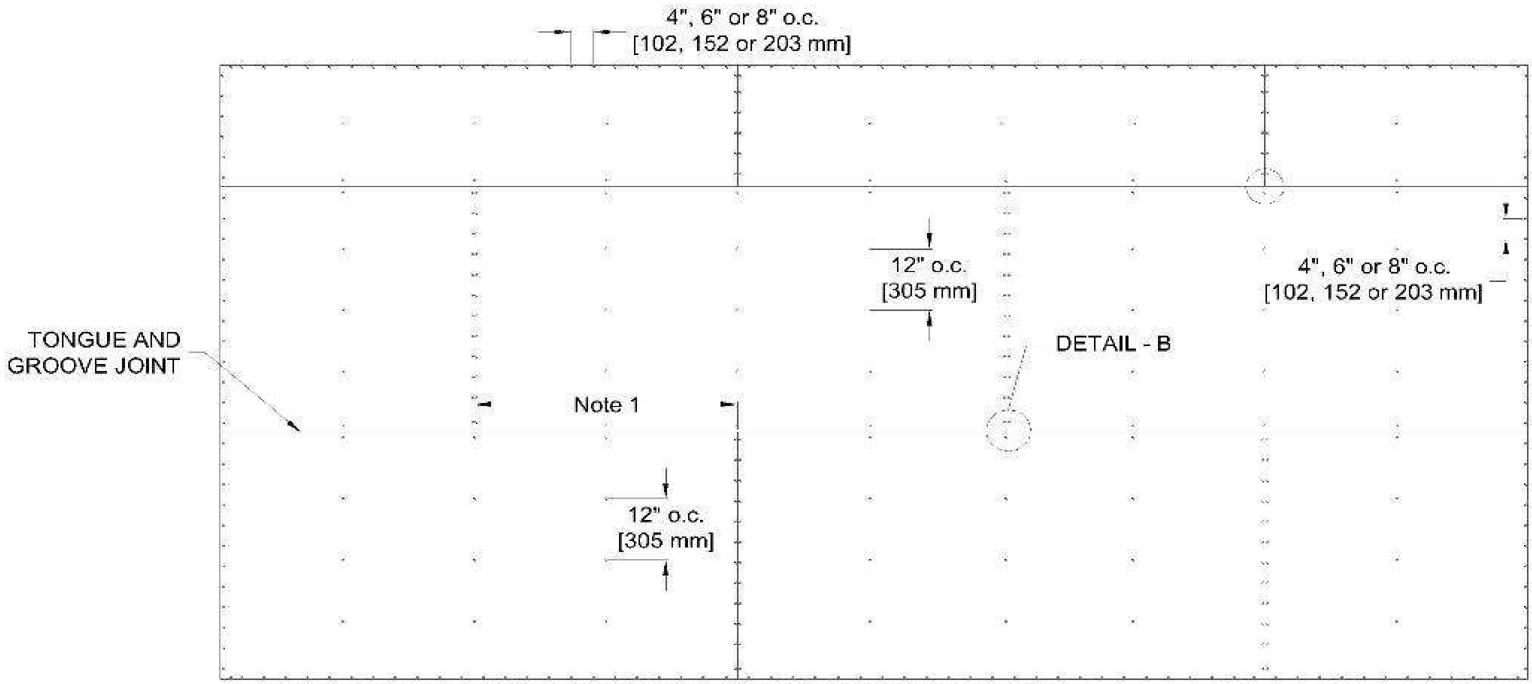
Screw Pattern A



DETAIL - A

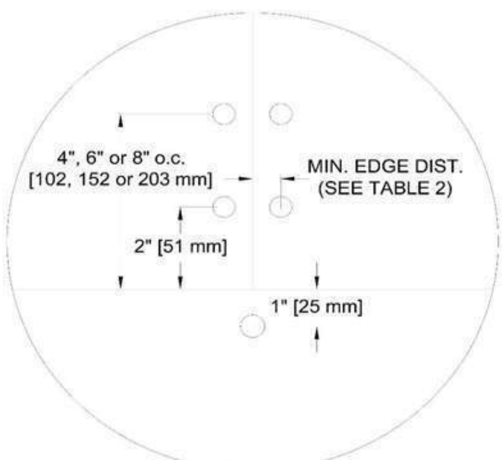


Tongue & Groove

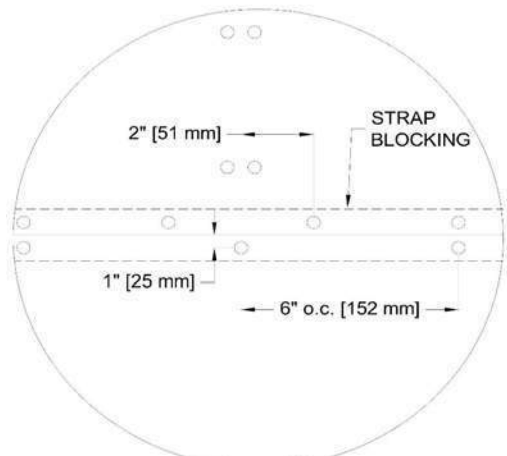


1. Two Span Minimum offset of Seams w/o Blocking, One Span offset w/ Blocking.

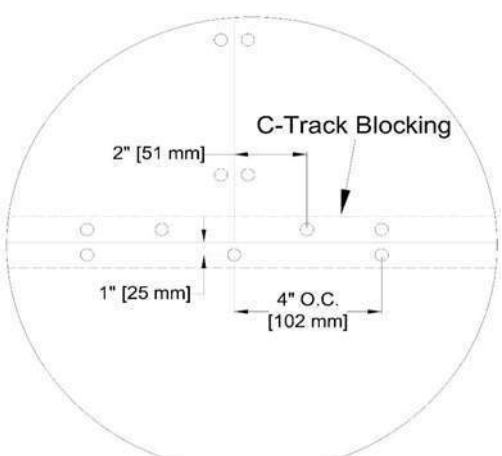
Screw Pattern B



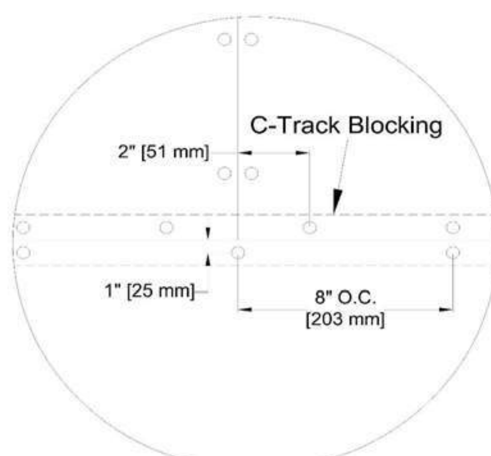
DETAIL -B



Strap Block Detail
for Screw Pattern C



C-Track Block Detail
for Screw Pattern D



C-Track Block Detail
for Screw Pattern E

USG Structural Solutions

USG STRUCTURAL PANEL CONCRETE ROOF DECK

FIELD INSTALLATION GUIDE

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USG STRUCTURAL PANEL CONCRETE ROOF DECK
CONTACT INFORMATION

PRODUCT INFORMATION

See usg.com for the most up-to-date product information.

CUSTOMER SERVICE

800 621-9523

TECHNICAL SERVICE

800 USG.4YOU (874-4968)

SAMPLES, LITERATURE AND PRODUCT INFORMATION

usg.com/structural

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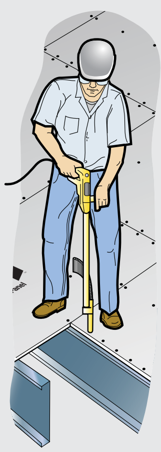
USG STRUCTURAL PANEL

RECOMMENDED TOOLS

USG Structural Panels are mechanically fastened to cold-formed steel joists, trusses or wood framing members. This document provides information regarding the recommended tools for proper installation of the panels, including recommended screws to attach the panels to the framing, as well as recommended tools for cutting the panels, creating penetrations, and attaching roof shingles.

RECOMMENDED FASTENERS WITH FASTENING SYSTEMS



To better secure and facilitate installation of USG Structural Panels to framing, USG recommends a variable-speed, high-torque drive with extension system. The use of ordinary high-speed, low torque drill guns are more likely to strip screw heads, thereby making it difficult to properly secure the panel to the steel framing. This may result in gapping between the panel and the supporting framing. Gaps formed by improper tightening of the fastener may result in the future settling of the panel onto the framing under normal floor loading, causing screw heads to rise up from the panel and protrude through underlayment and/or floor coverings.

USG recommends the following fasteners and fastening systems for the attachment of the screws listed above:

Framing Type	Compatible Fasteners[4]	Manufacturer & Fastening Model No.	Bits
CFS[1]	CGH8158LG	**Grabber Construction Products** 7525XT	T2178LN
		Hitachi Power Tools W6vB3SD2	
		Makita 6844 w. extension 194500-1	
	CBSDQ158S	**Simpson Strong-Tie Company** Quik Drive® PRO250 Subfloor System	BIT2SU
HRS[2]	CC12250LRG	**Grabber Construction Products** 7525XT	T3178LN
		Hitachi Power Tools W6vB3SD2	
		Makita 6844 w. extension 194500-1	
	TBG1260S	**Simpson Strong-Tie Company Inc.** Quik Drive® PROHSD60 or PROHSD75	BIT3SU
SPF Lumber[3]	C8200L2M	**Grabber Construction Products** 7525XT	T2178LN
		Hitachi Power Tools W6vB3SD2	
		Makita 6844 w. extension 194500-1	
	WSNTLG2S	**Simpson Strong-Tie Company Inc.** Quik Drive® PRO250 Subfloor System	BIT3SU
	GL24AABF[4]	**SENCO**[5] SCN65XP	—

Notes:

1. Cold-formed steel shall comply with AISI-General, with a minimum 54 mils or .0538-inch base metal thickness (No.16 gauge) and a minimum C60 galvanized coating. (1/2 in. [13 mm] Min. Edge Distance)
2. HRS – Hot-Rolled Steel shall be 1/4 in. (6.5 mm); A36 Hot-Rolled Steel (3/4 in. [19 mm] Min. Edge Distance)
3. SPF Lumber – 5/8 in. (16 mm) Min. Edge Distance
4. Fastener pull-through capacities can be found in PER 13067
5. SENCO 8d ring shank nails are manufactured with a length of 2-3/8 in. (60 mm), head diameter of 0.266 in. (6.75 mm) and a shank diameter of 0.113 in. (2.87 mm). Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.

General Notes: In accordance with PER-13067, the minimum screw pattern is 6 in. (153 mm) o.c. along the perimeter of the panels and 12 in. (305 mm) o.c. in the field of the panels. Do not use a larger size screw unless specified by the structural engineer. **A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects.**

CUTTING SYSTEM

Cutting the USG Structural Panel requires a carbide-tipped saw blade and a circular saw equipped with dust collection or suppression to control airborne dust.

The dust collection systems can be:

- Festool® Dust Extractor CT36 with HEPA filter
- Makita Model no. 5057KB – Circular Saw with Dust Collector
- DEWALT DWE575DC Dust Collection Adapter for DWE575/DWE575SB
- DEWALT DWS520SK Track Saw with Dust Collection

Note:
Do not use wet-blades or diamond-blades, as these will not efficiently cut the USG Structural Panel.

ADDITIONAL TOOLS

For penetrations, USG recommends the use of a common circular metal hole saw to make penetrations for pipe and conduit installation.

For electrical outlet openings and cut-outs, USG recommends the use of rotary tools, such as RotoZip® with 1/8 (3.25 mm) carbide steel spiral saw zip bit.

For the attachment of shingles, USG recommends the use of electro-galvanized collated roofing nails delivered by a professional grade pneumatic nailer with an air supply between 100 to 120 psi.

For floor anchorage, USG recommends the use of Toggler® Brand SNAPTOGGLE® Toggle bolts or SFS Intec (part no. TPR-L-6) for the attachment of anchors to USG Structural Panels. In accordance with PER-13067, **a qualified architect or engineer should review and approve withdrawal capacities, anchor type and spacing for all projects**.

For personal protection, USG recommends wearing safety glasses and a NIOSH-Approved N95 dust mask when cutting the panel. Dispose of collected dust in a safe manner and in compliance with local, state and federal laws and regulations. The contractor, installer, or other professionals who are responsible for the job site and familiar with its conditions shall be responsible for compliance with applicable health and safety laws.

CONTACT INFO

Departments	Name	Phone	Email
Sales - West	Jennifer Link	951 373-4994	jlink@usg.com
Sales - South Central	Breton Betz	720 665-3759	bbetz@usg.com
Sales - North East	Jim Ramsthaler	201 625-5170	jramsthaler@usg.com
Sales – South East	Stephen Sieger	321 594-8226	ssieger@usg.com
Sales - Midwest	Jose Estrada	312 436-4260	jmestrada@usg.com

PRODUCT INFORMATION
See usg.com for the most up-to-date product information.

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area, wear a NIOSH/MSHA approved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: get medical attention. Store locked up. Dispose of in accordance with local, state, and federal regulations. For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
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SCP26-USA-ENG/rev. 10-18

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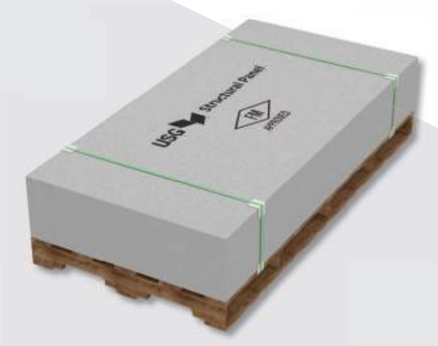
USG Structural Solutions

USG STRUCTURAL PANEL CONCRETE ROOF DECK



A concrete roof deck that can be combined with other noncombustible materials to create 1- and 2-hour fire-rated roof-ceiling assemblies.

- The only cementitious structural panel approved by Factory Mutual (FM)—FM Approval Standard 4472
- Strong, durable concrete panel; great uplift ratings
- Dimensionally stable; panel will not buckle or warp like wood sheathing; no moisture issues like structural concrete
- Installs fast and easy with appropriate dust collection
- Meets the criteria of ASTM E136-16 for use in all types of noncombustible construction
- Made in the USA

DESCRIPTION

USG Structural Panel Concrete Roof Deck is mechanically fastened to cold-formed steel joists, trusses or wood framing members; to create a structural substrate for ideal as low- and steep-slope roof systems, canopies and/or balconies. This roof system is designed to carry gravity and lateral loads. Roof membranes may be applied directly over USG Structural Panel Concrete Roof Decks. For retrofit or renovation projects, Concrete Roof Deck can also be installed on wood-joists, trusses or bar joists. See recommended fasteners within this submittal sheet.

USG Structural Panel Concrete Roof Decks can carry a total load, live and dead, of 150 psf (7.2 kPa) on cold-formed steel framing is spaced 48 in. (1,220 mm) o.c.

USG Structural Panel Concrete Roof Decks have a linear variation with change in moisture content of less than 0.10%. This means that the panels will not buckle or warp like wood sheathing.

Cutting USG Structural Panel Concrete Roof Decks require a carbide-tipped saw blade and a circular saw equipped with dust collection or suppression and control of airborne dust. Fastening is also conventional, using a screw gun and self-drilling No. 8-gauge screws. Because these panels are so durable, they may be installed in most weather conditions, including mild precipitation (rain or snow) and temperatures from 0°F to 125°F (-18°C to 52°C).

Refer to roof system manufacturer's written instructions, local code requirements and Factory Mutual Global (FMG) and/or Underwriters Laboratories (UL) requirements for proper installation techniques. For the attachment of shingles, USG recommends the use of electro-galvanized collated roofing nails installed by a professional grade pneumatic nailer with an air supply between 100 to 120 psi.

FIRE PERFORMANCE

- UL Classified (Type USGSP) for noncombustibility in accordance with ASTM E136-16 (CAN/ULC-S114)
- UL Classified (Type USGSP) as to Surface Burning Characteristics in accordance with ASTM E84 (CAN/ULC-S102)—Flame Spread 0 and Smoke Developed 0
- Class A, in accordance with UL790 (CAN/ULC-S107); see the *UL Building Materials Directory* for more information

SYSTEM PERFORMANCE

Description	Reference
FM Approved	Complies with requirements of FM 4472
Meets FM Class 1	
Code Report	PER-14076
Ultimate Uniform Load[a]	150 psf (7.2 kPa) @ 48" (1,220 mm) o.c.; see table
Shear Diaphragm Ratings	1641 plf[b] (23.9 kN/m)
UL 1-, 1.5-, 2-Hour Fire Resistance Designs	P561, P562, P573
UL Roofing System, Uplift Resistance	TGIK.R25352

(a) On steel framing.
(b) Joists spaced 48" (1219.2 mm) o.c. and fasteners spaced 4" (102 mm) o.c. at the perimeter and 12" (305 mm) o.c. in field, fully blocked. See the Progressive Engineering Inc. Product Evaluation Report PER-14076.

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WARNING

USG Structural Panel Concrete Roof Decks should not be left in service without an appropriate roof or weather-resistive membrane covering.

INSTALLATION

To perform in the expected manner, USG Structural Panel Concrete Roof Decks must be installed according to USG specifications, using only the listed materials and components. For a complete set of specifications, email usgstructural@usg.com.

As with all types of construction, appropriate safety procedures must be followed to protect installers from personal injuries resulting from lifting incorrectly, falling, and eye, hand and lung irritation.

Care must be taken when placing pallets of USG Structural Panel Concrete Roof Decks on roof framing. A pallet of USG Structural Panel Concrete Roof Decks consists of 20 sheets of our 3/4 in. x 4 ft. x 8 ft. panels (19 mm x 1,220 mm x 2,440 mm) nominal (the T&G panels have an actual width of 47-3/4 in. [1,213 mm]), and weighs approximately 3,400 lb. (1,542 kg). Do not exceed limits when loading pallets or panels on open framing or completed roof assemblies. Store units next to structural walls where the joists meet the wall. See *USG Structural Panel Concrete Roof Deck Field Installation Guideline* (SCP43) for additional information.

RECOMMENDED FASTENERS

USG recommends the following fasteners for the installation of USG Structural Panels to structural framing:

Manufacturer	16 ga. Cold-Formed Steel (1/2 in. [13 mm] Min. Edge Distance)		SPF Lumber (5/8 in. [16 mm] Min. Edge Distance)		1/4 in. (6.5 mm) A36 Hot-Rolled Steel (3/4 in. [19 mm] Min. Edge Distance)	
	Part #	Fastener Pull-Through[1]	Part #	Fastener Pull-Through[1]	Part #	Fastener Pull-Through[1]
Grabber Construction Products, Inc.	CGH8158LG	581 lb. (264 kg)	C8200L2M	581 lb. (264 kg)	CC12250LRG	581 lb. (264 kg)
Simpson Strong-Tie Company Inc.	CBSDQ158S	581 lb. (264 kg)	WSNTLG2S	581 lb. (264 kg)	TBG1260S	581 lb. (264 kg)
SENCO[2]	—	—	GL24AABF[3]	581 lb. (264 kg)	—	—

Notes:
1. Fastener pull-through capacities are based upon the minimum average ultimate tested capacity for all tabulated fasteners. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).
2. SENCO 8d ring shank nails are manufactured with a length of 2-3/8 in. (60 mm), head diameter of 0.266 in (6.75 mm), and a shank diameter of 0.113 in. (2.87 mm). Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.
3. Minimum edge distance for nails is 1/2 in. (13 mm).

General Notes: In accordance with PER-14076, the minimum screw pattern is 6 in. (153 mm) o.c. along the perimeter of the panels and 12 in. (305 mm) o.c. in the field of the panels. Do not use a larger size screw unless specified by the structural engineer. **A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects**.

FRAMING

The steel roof framing must be designed to meet the strength and deflection criteria specified in the contract documents. The attachment flange or bearing edge must be a minimum 1-5/8 in. (41 mm) wide with at least 3/4 in. (19 mm) of the panel bearing on the supporting flange. Metal framing must be a minimum 16 gauge (54 mils, or 0.0538 in. [1.36 mm]) and spaced no greater than 48 in. (1,220 mm) o.c. Follow the contract documents and the steel framing manufacturer's recommendations for the proper installation and bracing of the framing.

TRAFFIC PROTECTION

Place sheathing materials (i.e. additional layer of USG Structural Panel or plywood) on the roof in high traffic areas to protect newly installed concrete roof decks. See *USG Structural Panel Concrete Roof Deck Field Installation Guideline* (SCP43) for additional information.

APPLICATION

Cut panels to size with a circular saw equipped with carbide-tipped blade and a dry dust collection device or a water-dispensing device that limits the amount of airborne dust. Wear safety glasses and a NIOSH-approved N95 dust mask when cutting this panel. Dispose of collected dust in a safe manner and in compliance with local, state and federal ordinances.

APPLICATION CONT.

Install USG Structural Panel Concrete Roof Decks with the long edges perpendicular to the framing. Apply the panel with the print markings facing up toward the installer. Fasten each panel after it has been placed following the fastening schedule listed in the contract documents. Install panels in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows. **Tongue and groove joints should be free of debris and fitted tightly without any gapping.** For all panels less than 24 in. (610 mm) wide, all edges must be supported by blocking. Blocking must be cold-formed from steel complying with AISI General, with a minimum 54 mils (0.0538 inch or 1.36 mm) base metal thickness (no. 16 gauge) and a minimum G60 galvanized coating. The attachment flange or bearing edge must be at least 1-5/8 in. (41 mm) wide and at least 3/4 in. (19 mm) of the panel must bear on the supporting flange or edge. See *USG Structural Panel Concrete Roof Deck Field Installation Guideline* (SCP43) for additional information.

Installed panels shall not be exposed to weather for more than 90 days. Care must be taken to avoid accumulation of snow and/or ice on installed panels. Brooms should be used for snow removal whenever possible. Excessive shoveling or scraping may damage installed panel surface.

In the event of significant accumulations of snow and/or ice, use indirect heat from temporary space heaters to melt the affected areas. To prevent damage to USG Structural Panel Concrete Roof Decks, never expose the panels to direct flame for the purpose of snow removal and/or deicing efforts. At no time should salts, fertilizers or other chemicals be used on the panels for anti-icing and/or deicing purposes.

ROOFING SYSTEM

Follow the contract documents and the roof system manufacturer's recommendations for the application of roof materials. Before the application of roof materials, ensure that all panels are properly fastened, with the fastener head driven flush or slightly below the surface of the panels.

PRODUCT DATA

Sizes and Packaging: 3/4 in. x 4 ft. x 8 ft. (19 mm x 1,220 mm x 2,440 mm) panels. Each panel weighs approximately 170 lb. (77 kg) and is intended to be handled by two people. USG Structural Panel Concrete Roof Decks are packaged in 20-piece units.

Availability: USG Structural Panel Concrete Roof Decks are sold through any USG distributor. Email usgstructural@usg.com for information on availability and a dealer in your area.

Storage: USG Structural Panel Concrete Roof Decks are shipped in 20-piece units. Panels should be stored in a horizontal position and uniformly supported. Panels must be covered when stored in unprotected areas.

Excessive moisture and freezing temperatures may result in panels sticking together within the units. Therefore, care should be taken to ensure units of USG Structural Panel Concrete Roof Decks are not exposed to excessive moisture, ice and snow. In the event that panels do become frozen together within a unit, the unit needs to be brought to a temperature above 32°F (0°C) to allow the ice to melt naturally. Never physically pry panels apart. Salt, fertilizer or other deicing agents should not be used at any time. Covering the units completely with tarps or similar coverings is an easy way to avoid panels freezing together.

Maintenance: USG Structural Panel Concrete Roof Decks do not require any regular maintenance except to remove standing water and repair damage from abuse. Any cracked or broken panels should be replaced with sound USG Structural Panel Concrete Roof Decks that are secured following the fastening schedule prescribed in the original installation documents. The replacement panels must be a minimum of 24 in. (610 mm) wide and must span a minimum of two supports. If not, the replacement panel must be fully blocked on all sides. See *USG Structural Panel Concrete Roof Deck Field Installation Guideline* (SCP43) for additional information.

TEST DATA

Physical and Mechanical Properties	Test Standard	Typical Values Standard (Metric)
Noncombustibility	ASTM E136-16 (unmodified) CAN/ULC-S114	Passed
Surface-burning characteristics (flame spread/smoke developed)	ASTM E84 CAN/ULC-S102	0/0
Weight at 3/4 in. (19 mm) thickness	ASTM D1037	5.3 lb./ft.^{2} (26 kg/m^2)
Density[a]	ASTM C1185	75 lb./ft.^{3} (1,201 kg/m^3)
Mold resistance	ASTM D3273 ASTM G21	10 0
Termite resistance	AWPA Standard E1-13	9.8
Low VOC emissions	CDPH/EHLB/Standard Method V1.1-2010[b]	Compliant

TEST DATA CONT.

Physical and Mechanical Properties	Test Standard	Typical Values Standard (Metric)
Concentrated load	ASTM E661	550 lb. (2.45 kN) static 0.108 in. (2.7 mm) max. deflection @ 200 lb. (0.89 kN)
Fastener lateral resistance[c]	ASTM D1761, Sec. 10.2	>210 lb. (0.93 kN) dry >160 lb. (0.71 kN) wet
pH value	ASTM D1293	10.5
Linear variation with change in moisture (25% to 90% relative humidity)	ASTM C1185, Sec. 8	<0.10%
Thickness swell	ASTM D1037, B	Max. 3.0%
Freeze/thaw resistance	ASTM C1185	Passed (50 cycles)
Water absorption[d]	ASTM C1185, Sec. 5.2.3.1	<15.0%
Long-term durability	ASTM C1185, Sec. 13	Min. 75% retention of physical properties
Water durability	ASTM C1185, Sec. 5	Min. 70% retention of physical properties

(a) Density measured at equilibrium conditioning per Section 5.2.3.1., 28 days after manufacturing.
(b) Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010 (Emission testing method for CA Specification 01350).
(c) Fastener lateral resistance measured with #8, 1-5/8 in. (41 mm), winged, self-drilling screw.
(d) Absorption measured from equilibrium conditioning followed by immersion in water for 48 hours.

LOAD TABLE

The following table represents the Load Capacity of USG Structural Panel Concrete Roof Decks. The uplift capacities in this table represent the attachment of the Concrete Roof Deck to the structural framing members. The values for a roofing system are obtained from the roofing system manufacturer's testing and specific installation instructions. For the most up-to-date load tables, see the Progressive Engineering Inc. Product Evaluation Report PER-14076. For technical questions, email usgstructural@usg.com. **A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects.**

Ultimate Load Capacity for USG Structural Panel Concrete Roof Deck

Joist Spacing - inches (mm)	Uniform Load - psf (kPa)[1,2,3]	Uplift Capacity – psf (kPa)[1,2,3]			
		Fastener spacing (edge/field)			
		8/12	8/8	6/6	4/4
12 inch (304.8 mm)	1,320 (63.2)	513 (24.6)	770 (36.9)	1,026 (49.1)	1,320 (63.2)
16 inch (406.4 mm)	744 (35.6)	385 (18.4)	557 (27.6)	744 (35.6)	744 (35.6)
24 inch (609.6 mm)	330 (15.8)	257 (12.3)	330 (15.8)	330 (15.8)	330 (15.8)
32 inch (812.8 mm)	240 (11.5)	192 (9.19)	240 (11.5)	240 (11.5)	240 (11.5)
48 inch (1,220 mm)[4]	150 (7.2)	128 (6.1)	150 (7.2)	150 (7.2)	150 (7.2)

For SI: 1 inch = 25.4 mm, 1 psf = 47.88 Pa.
(1) **Ultimate Load Values have no safety factor included.**
(2) Two framing spans minimum per panel piece.
(3) Ultimate Uniform Load Table for general reference only.
For complete load capacities, consult Progressive Engineering Inc. Product Evaluation Report PER-14076
(4) Blocking at all joints perpendicular to framing to be a minimum of 16 gauge (54 mils, or 0.0538 inch [1.37 mm]), 3-5/8 in (92 mm) wide track. For sheathing installation where a single span condition exists, additional track blocking is required perpendicular to the framing located midway between the edges of the panel.

SUBMITTAL APPROVALS

Job Name	
Contractor	Date

PRODUCT INFORMATION
See usg.com for the most up-to-date product information.

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area, wear a NIOSH/MSHAapproved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: Get medical attention. Store locked up. Dispose of in accordance with local, state, and federal regulations. For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

NOTICE
We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

SAFETY FIRST!
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protection equipment. Read SDS and literature before specification and installation.

FM APPROVED

800 USG.4YOU
800 (874-4968)
usg.com/structural

Manufactured by
United States Gypsum Company
550 West Adams Street
Chicago, IL 60661

MSRP based upon full truckload delivered to jobsite:
Roof Deck: $5.40/sf

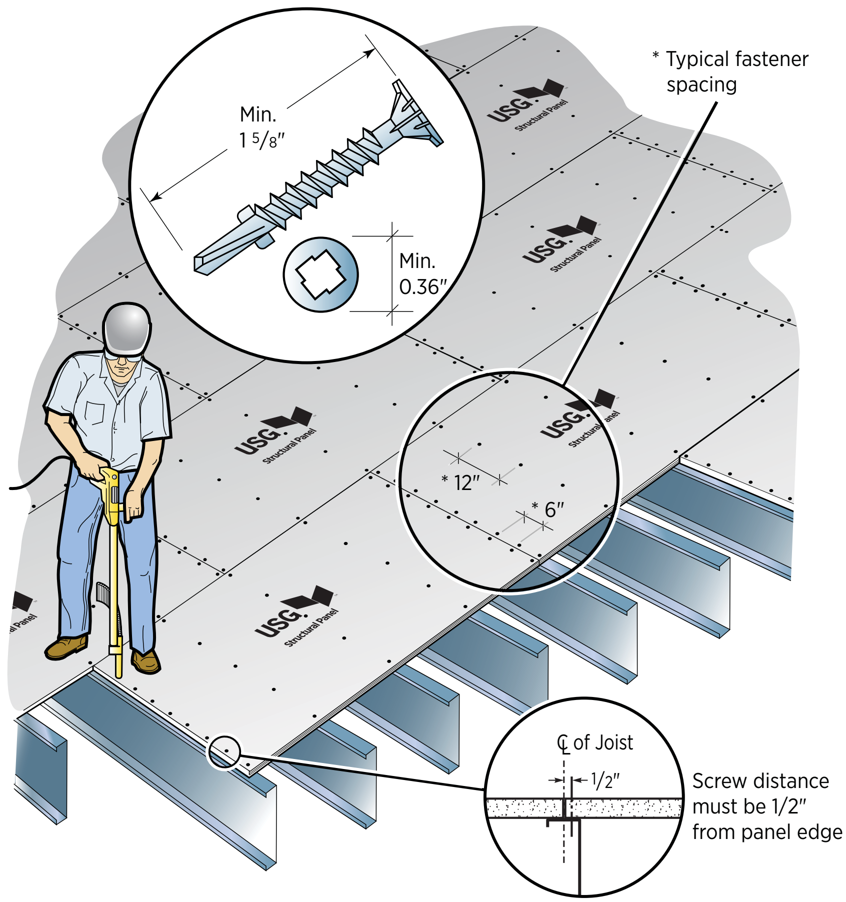
SCP35-USA-ENG/rev. 10-18

USG IT'S YOUR WORLD. BUILD IT.®

USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL FASTENING

- Proper fall restraint equipment required.
- Use only #8 screw with 1-5/8″ (41 mm) joist flange.
- Apply screws with a stand-up gun to reduce fatigue.
- Follow fastening schedule in contract documents.

Note: *Fastener schedule is to be specified by designer of record.



USG recommends the following fasteners for the installation of USG Structural Panels to structural framing:

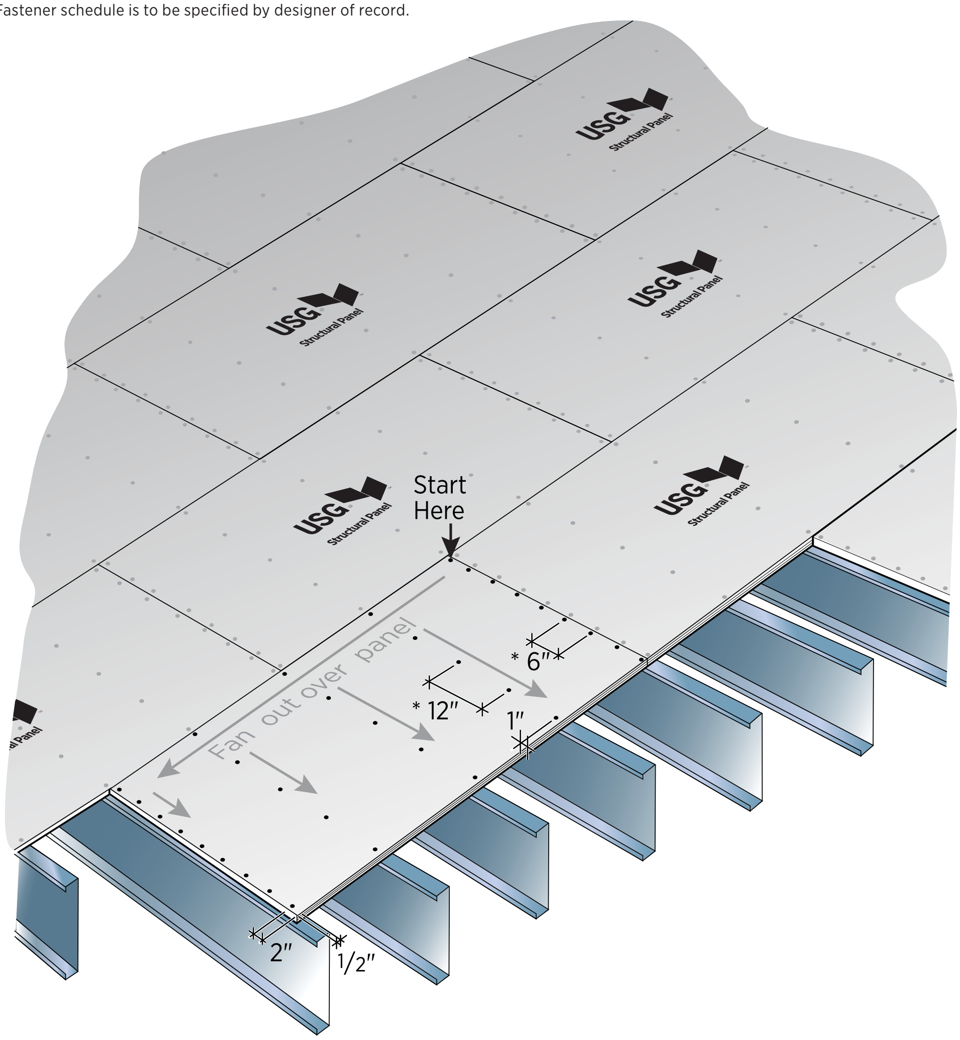
Manufacturer	16 ga. Cold-Formed Steel (1/2 in. [13 mm] Min. Edge Distance)		SPF Lumber (5/8 in. [16 mm] Min. Edge Distance)		1/4 in. (6.5 mm) A36 Hot-Rolled Steel (3/4 in. [19 mm] Min. Edge Distance)	
	Part #	**Fastener Pull-Through[1]**	**Part #**	**Fastener Pull-Through[1]**	**Part #**	**Fastener Pull-Through[1]**
Grabber Construction Products, Inc.	CGH8158LG	581 lb. (264 kg)	C8200L2M	581 lb. (264 kg)	CC12250LRG	581 lb. (264 kg)
Simpson Strong-Tie Company Inc.	CBSDQ158S	581 lb. (264 kg)	WSNTLG2S	581 lb. (264 kg)	TBG1260S	581 lb. (264 kg)
SENCO[2]	—	—	GL24AABF[3]	581 lb. (264 kg)	—	—

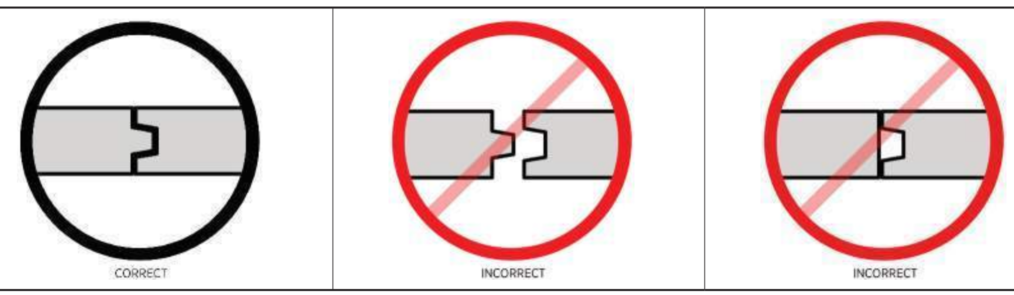
Notes:
1. Fastener pull-through capacities are based upon the minimum average ultimate tested capacity for all tabulated fasteners. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).
2. SENCO 8d ring shank nails are manufactured with a length of 2-3/8 in. (60 mm), head diameter of 0.266 in (6.75 mm), and a shank diameter of 0.113 in. (2.87 mm). Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.
3. Minimum edge distance for nails is 1/2 in. (13 mm).

General Notes: In accordance with PER-14076, the minimum screw pattern is 6 in. (153 mm) o.c. along the perimeter of the panels and 12 in. (305 mm) o.c. in the field of the panels. Do not use a larger size screw unless specified by the structural engineer. **A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects**.

USG STRUCTURAL PANEL CONCRETE ROOF DECK
FASTENING THE PANEL

Note: *Fastener schedule is to be specified by designer of record.





When connecting the tongue and groove, the tongue from the loose panel should be engaged into the groove of the already affixed panel.

To ensure proper panel application, be sure to:

1. Lay board down.

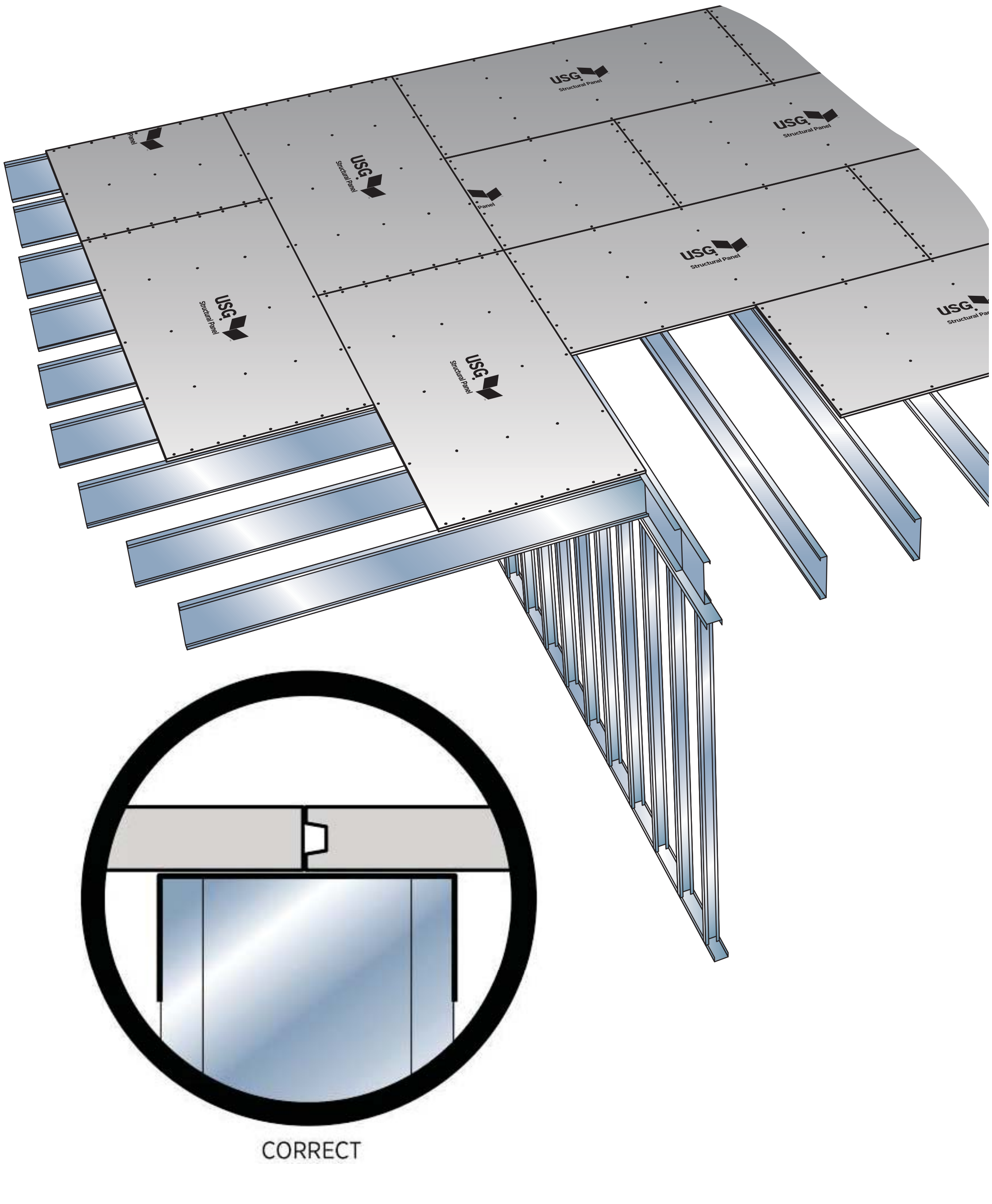
2. Engage tongue and groove (T&G).

3. Fasten one corner.

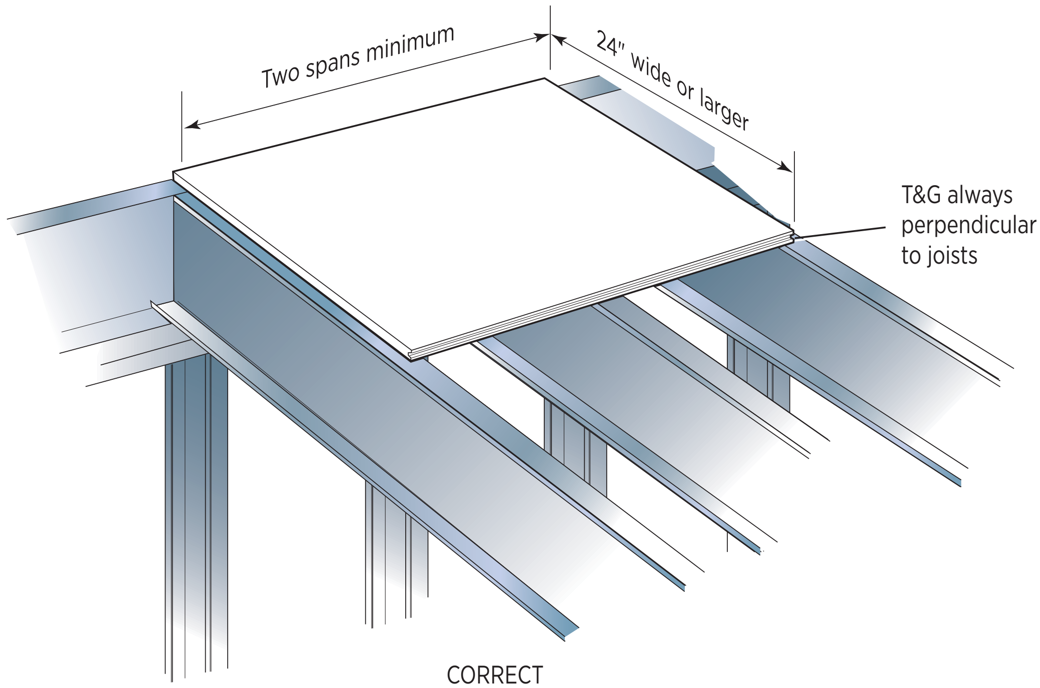
4. Fan out over the panel.

USG STRUCTURAL PANEL CONCRETE ROOF DECK
FRAMING DIRECTION CHANGE

• Always lay panels perpendicular to supporting joists.



USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL LAYOUT: TWO-SPAN CONDITION



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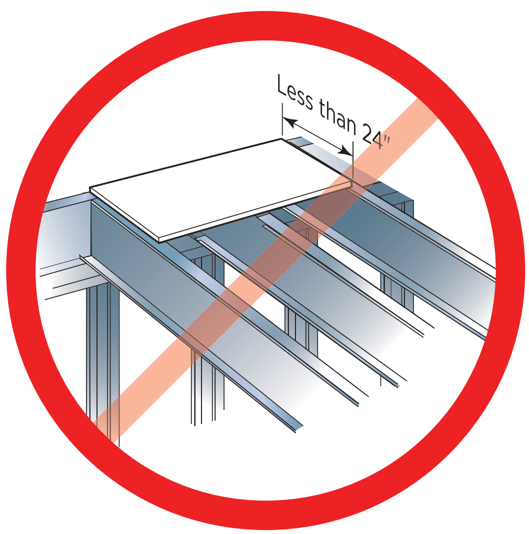

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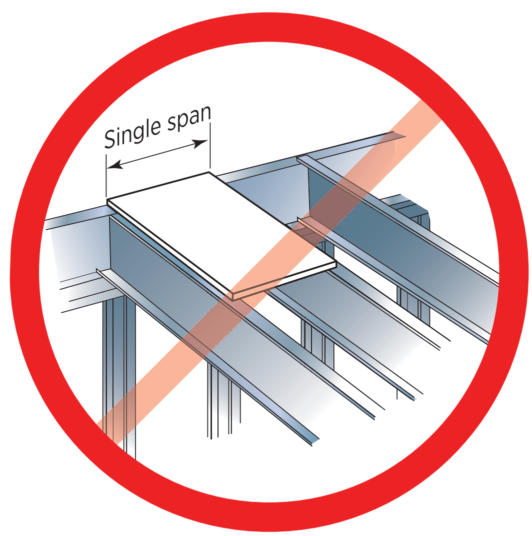


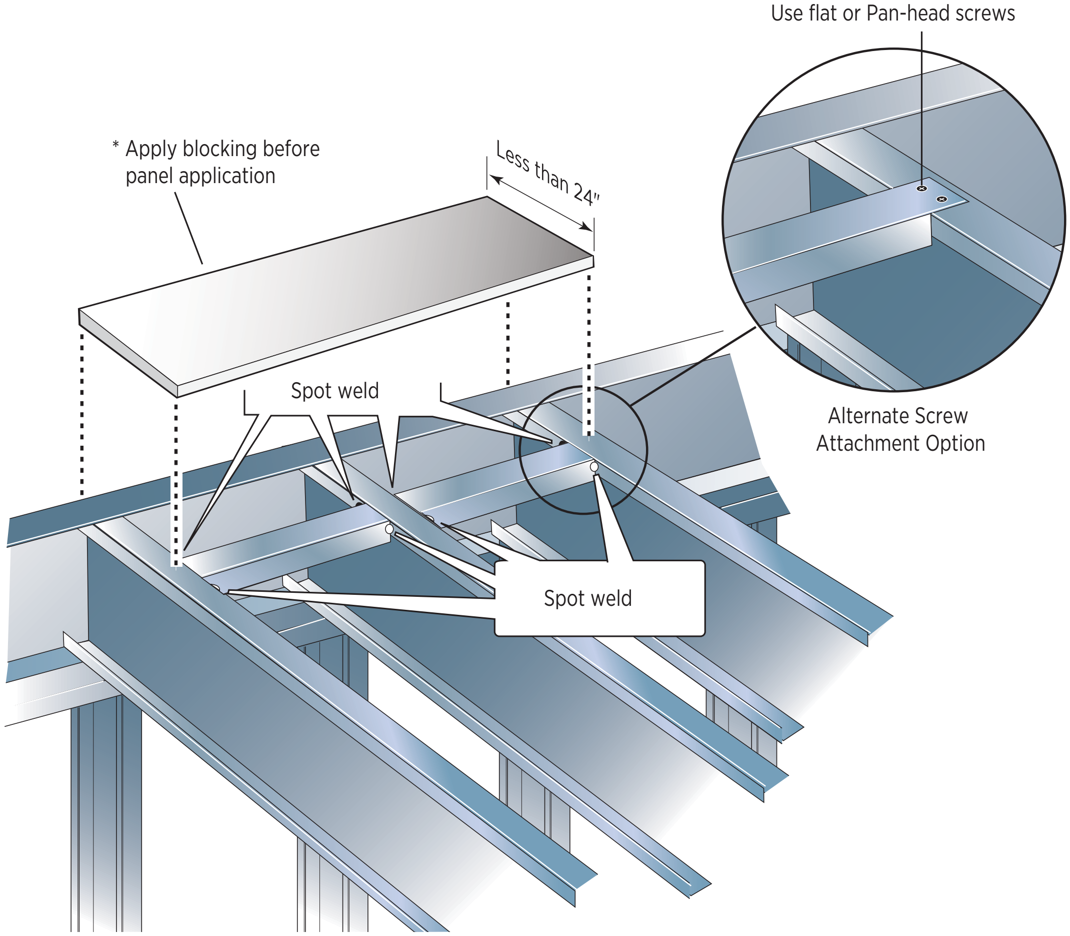
INCORRECT

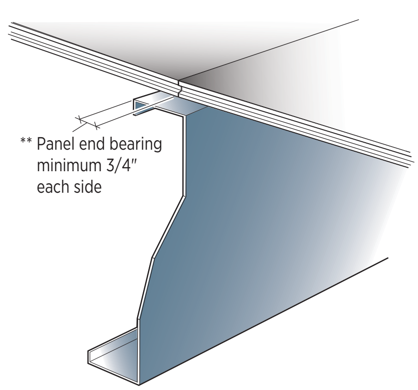
See Panel Blocking—Page 12

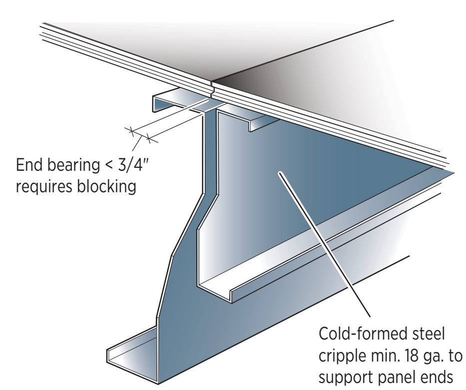
USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL BLOCKING

- Block edges that are less than 24″ (610 mm) wide.
- Field welding to cold-formed framing members must be performed by certified welder and approved by structural engineer of record.
- If screws are used, do not use hex head screws, as they will raise the panel.

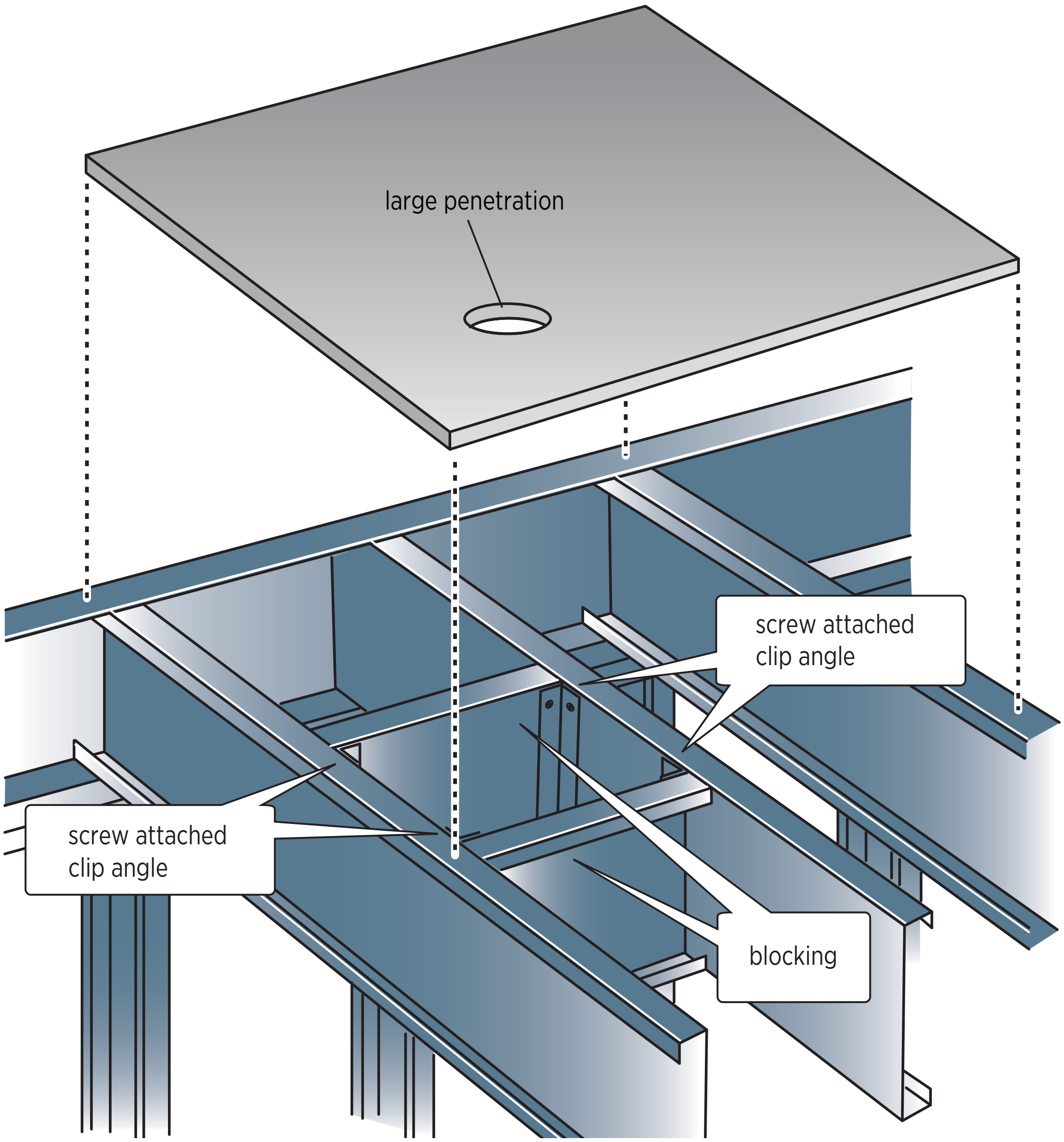
Note:
*Panel Blocking must be specified by designer of record.
**Panels must bear at least 3/4″ (19 mm) over joist flange.







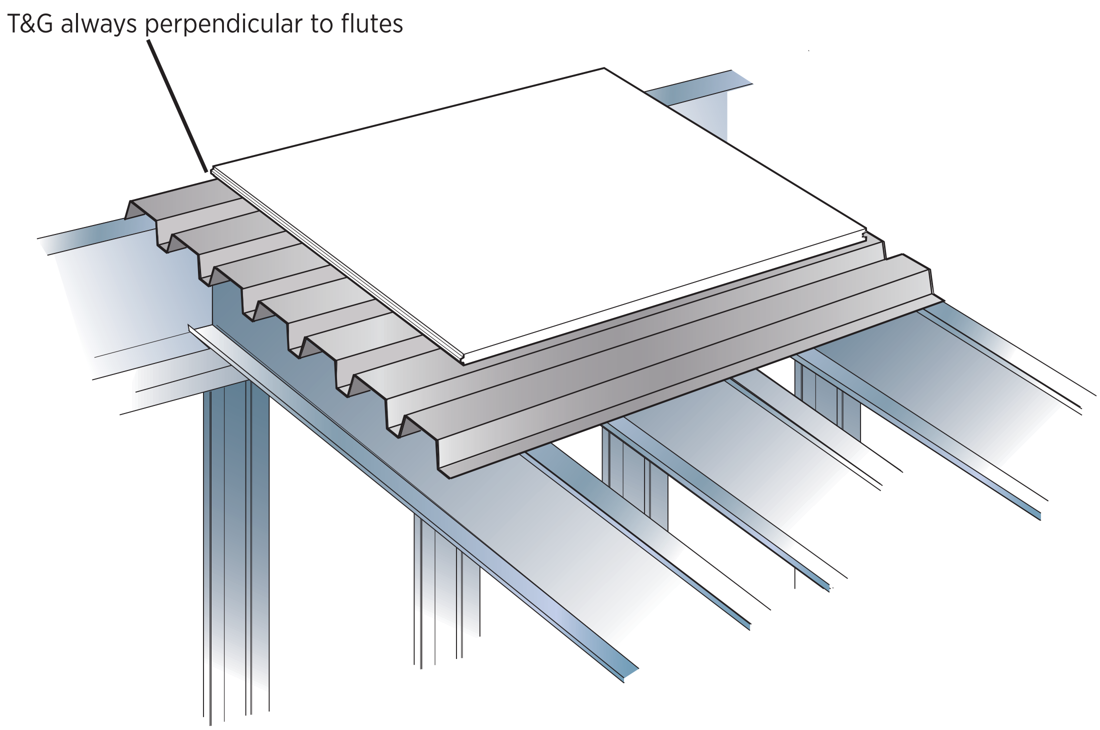
USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL PENETRATION

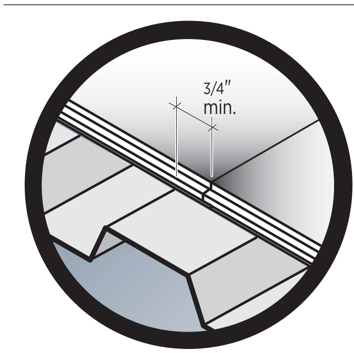


Unreinforced Penetrations	Reinforced Penetrations
• Unreinforced penetrations are limited to a maximum dimension of 6″ (153 mm) and do not require supplemental framing or engineer analysis. • Unreinforced penetrations are generally small openings through decks to accommodate lightly loaded plumbing/electrical runs.	• An opening with a dimension greater than 6″ (153 mm) requires reinforcement at the perimeter of the opening. • The framing at reinforced penetrations, as a minimum, must have an equal profile and capacity as the adjacent primary framing (joists) members. • The maximum penetration dimension is not limited to a single opening, but also includes group effect of multiple, closely spaced openings.

USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL LAYOUT: OVER FLUTED DECK

- The concrete roof deck on fluted deck is always considered an underlayment.
- The concrete roof deck is not considered a structural component.
- There is no composite action between fluted deck and the concrete roof deck.





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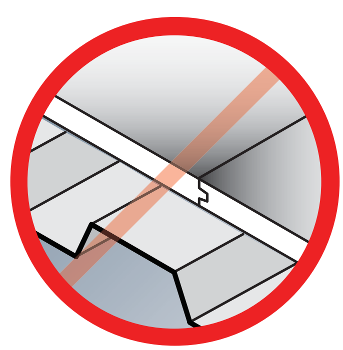
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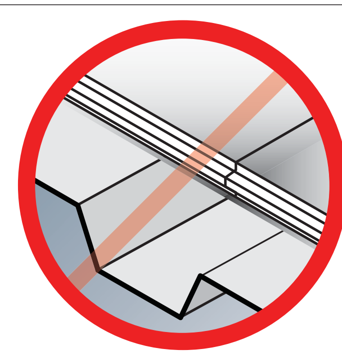
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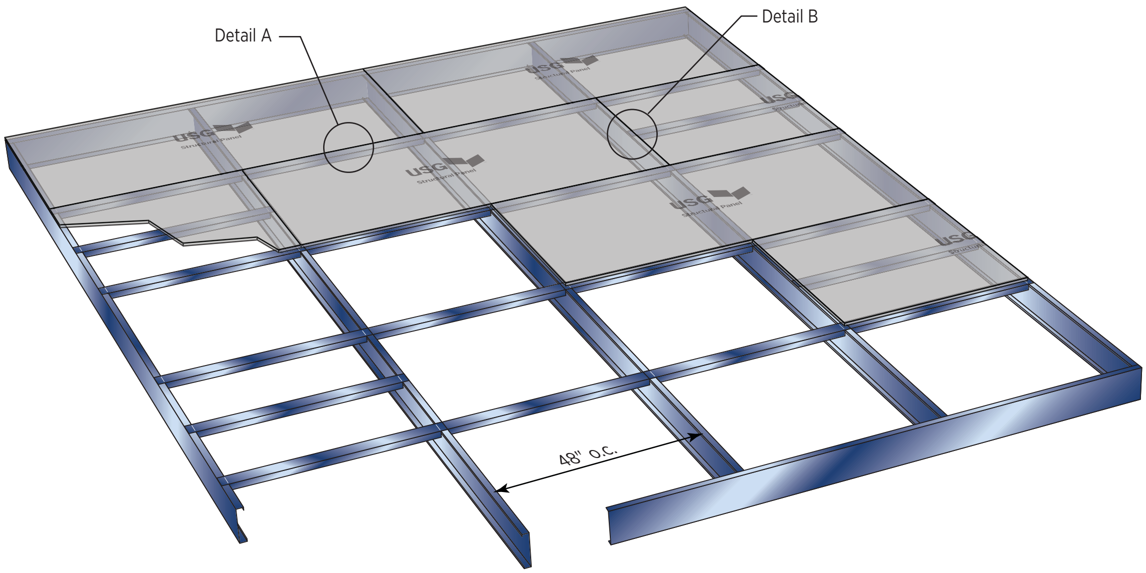
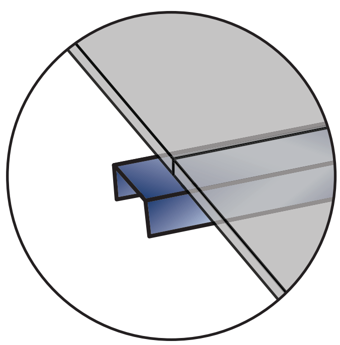
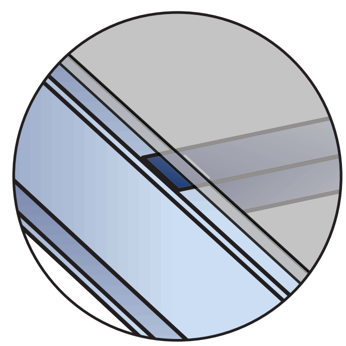
USG STRUCTURAL PANEL CONCRETE ROOF DECK

PANEL LAYOUT: 48" O.C. JOISTS





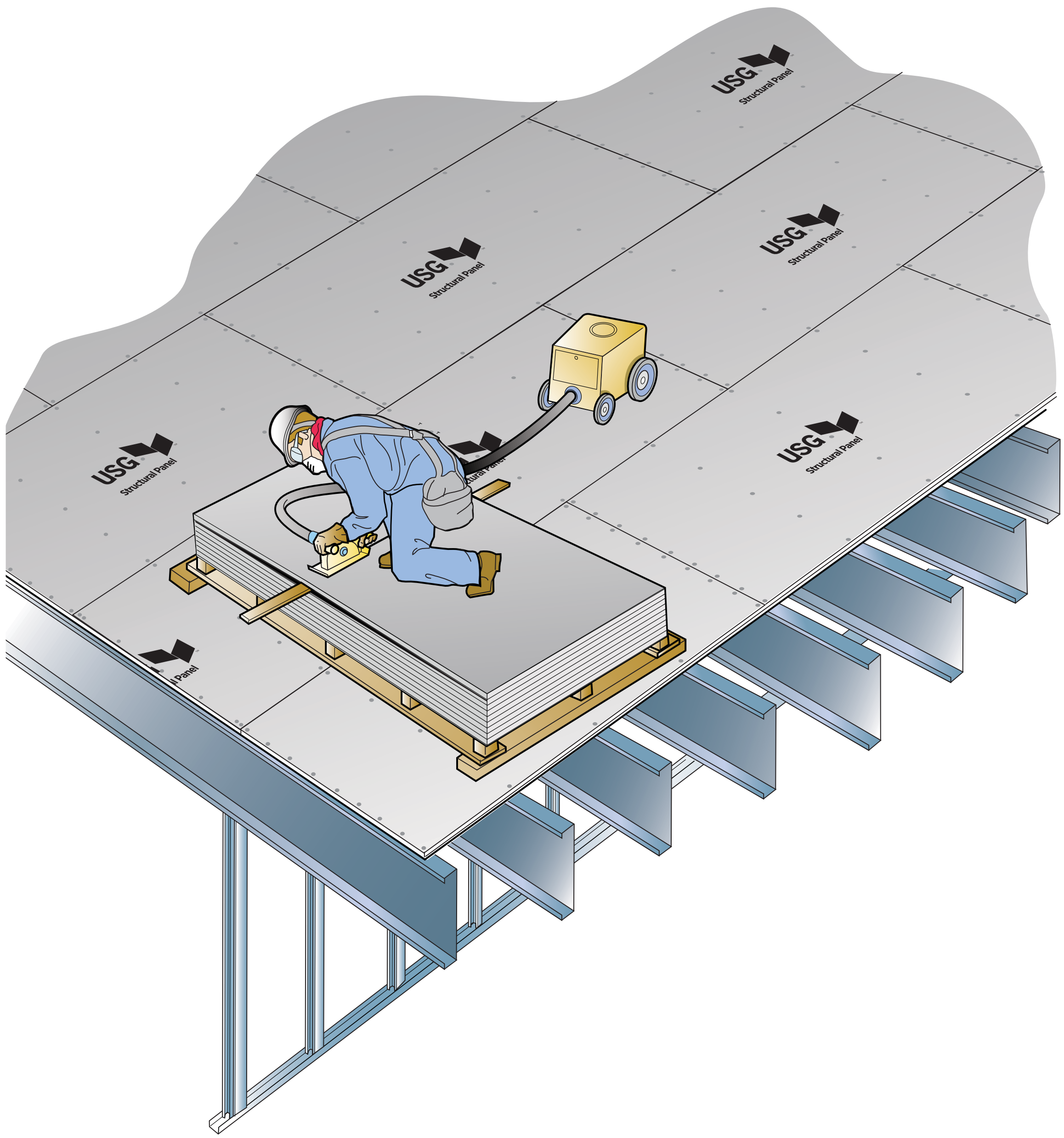
Detail A



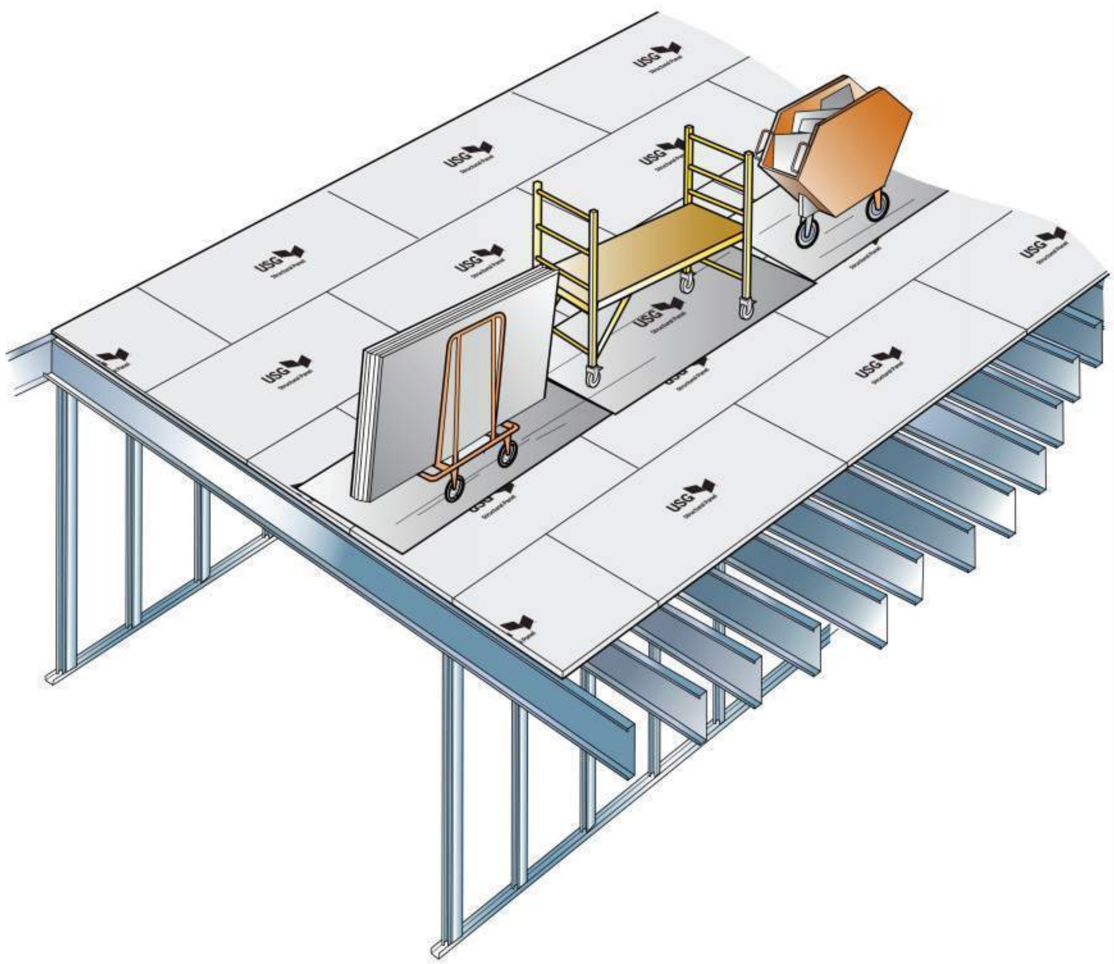
Detail B

USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL CUTTING

- Use a dust vacuum.
- Wear appropriate respiratory protection.
- Wear safety glasses.
- Wear gloves.
- Proper fall restraint equipment required.
- Review the Safety Data Sheet (SDS) for use of proper Personal Protective Equipment (PPE).



USG STRUCTURAL PANEL CONCRETE ROOF DECK
EQUIPMENT LOADING

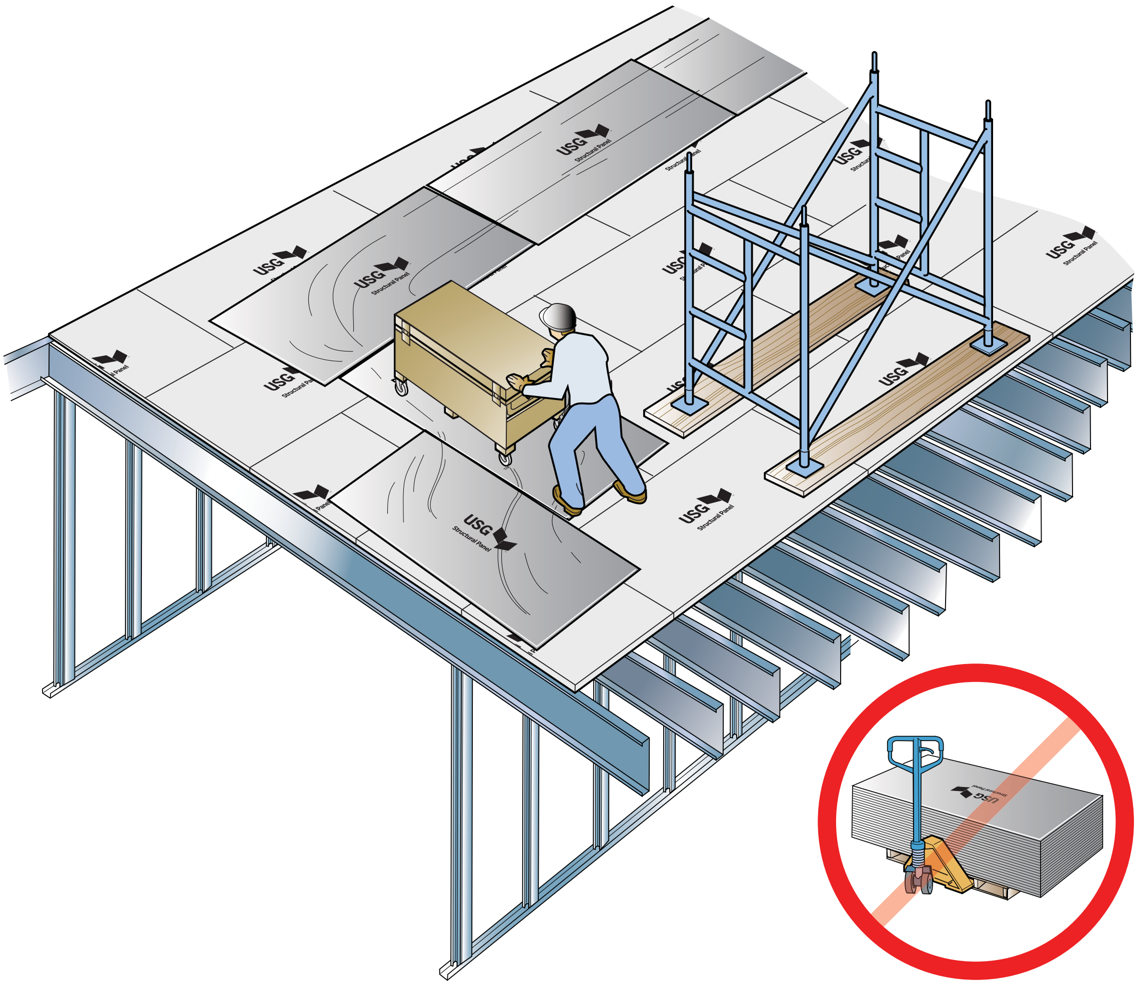


Typical Construction Equipment*	
Drywall Carts	10 Sheets of 5/8″ x 4′ x 12′ (16 mm x 1,220 mm x 3,660 mm) Gypsum Panels max. 1,200 lb. (544 kg)
	7 Sheets of 3/4″ x 4′ x 8′ (19 mm x 1,220 mm x 2,440 mm) USG Structural Panels max. 1,200 lb. (544 kg)
Rolling Trash Carts	1,000 lb. max. (453 kg)
Rolling Scaffolds	750 lb. max. (340 kg)

Note: Secure the cart. *Loads applicable to 24″ (610 mm) o.c. maximum framing spacing.

See Panel Protection—Page 18

USG STRUCTURAL PANEL CONCRETE ROOF DECK
PANEL PROTECTION

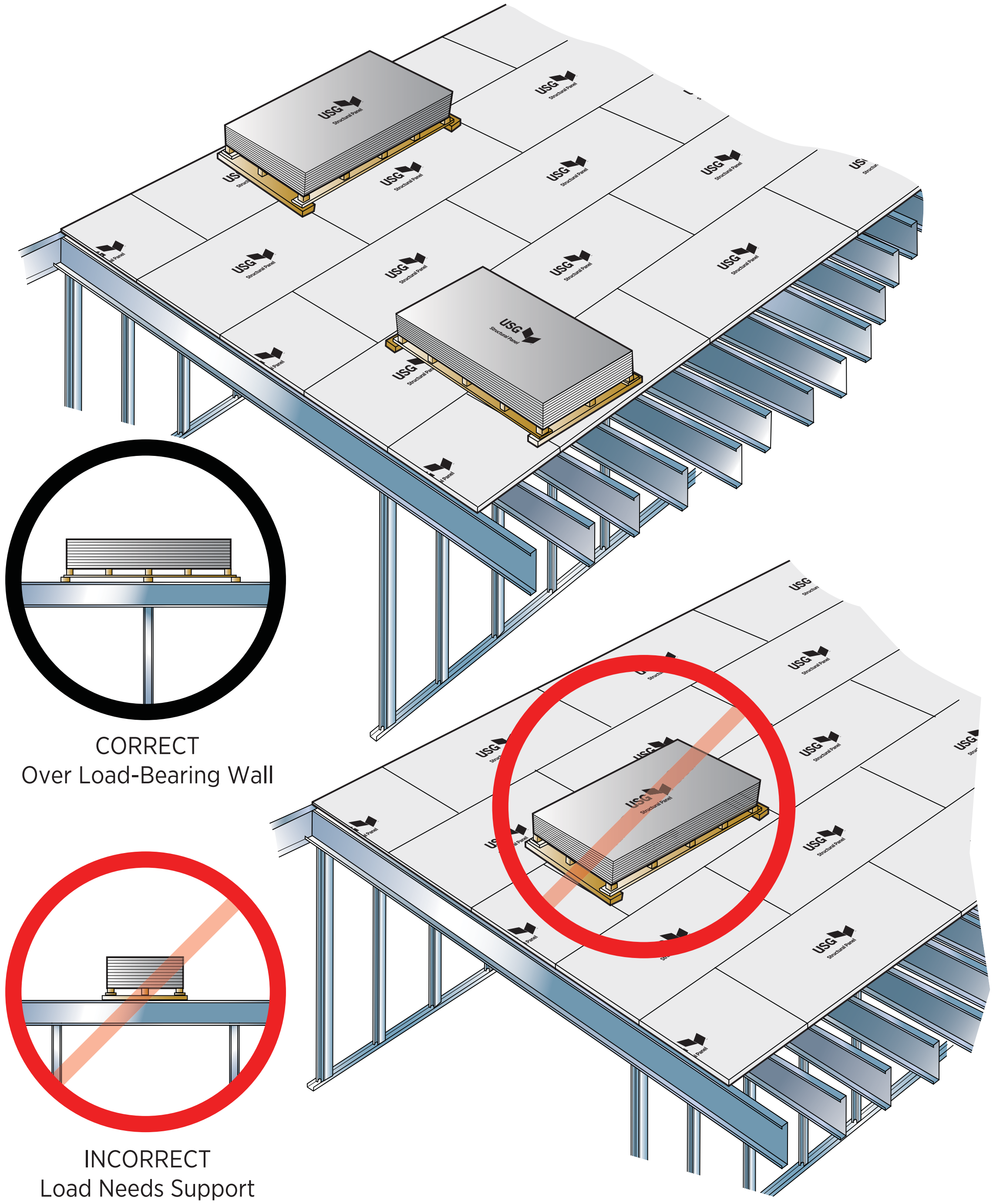


To protect installed panels during construction:

- Place load spreader planks perpendicular to joists for fixed scaffolding.
- Place additional USG Structural Panels or plywood on the floor in high-traffic construction pathways for rolling gang boxes, two-wheel mason carts and trash boxes.
- Avoid rolling carts near protector panel edges.
- **Do not use a pallet jack on the roof deck.**
- Consult with designer of record for load limits and proper support for all construction loads.
- Proper fall restraint equipment required.
- High traffic areas must be protected, consider supporting T&G in corridors.
- If T&G is damaged, it must be fixed.

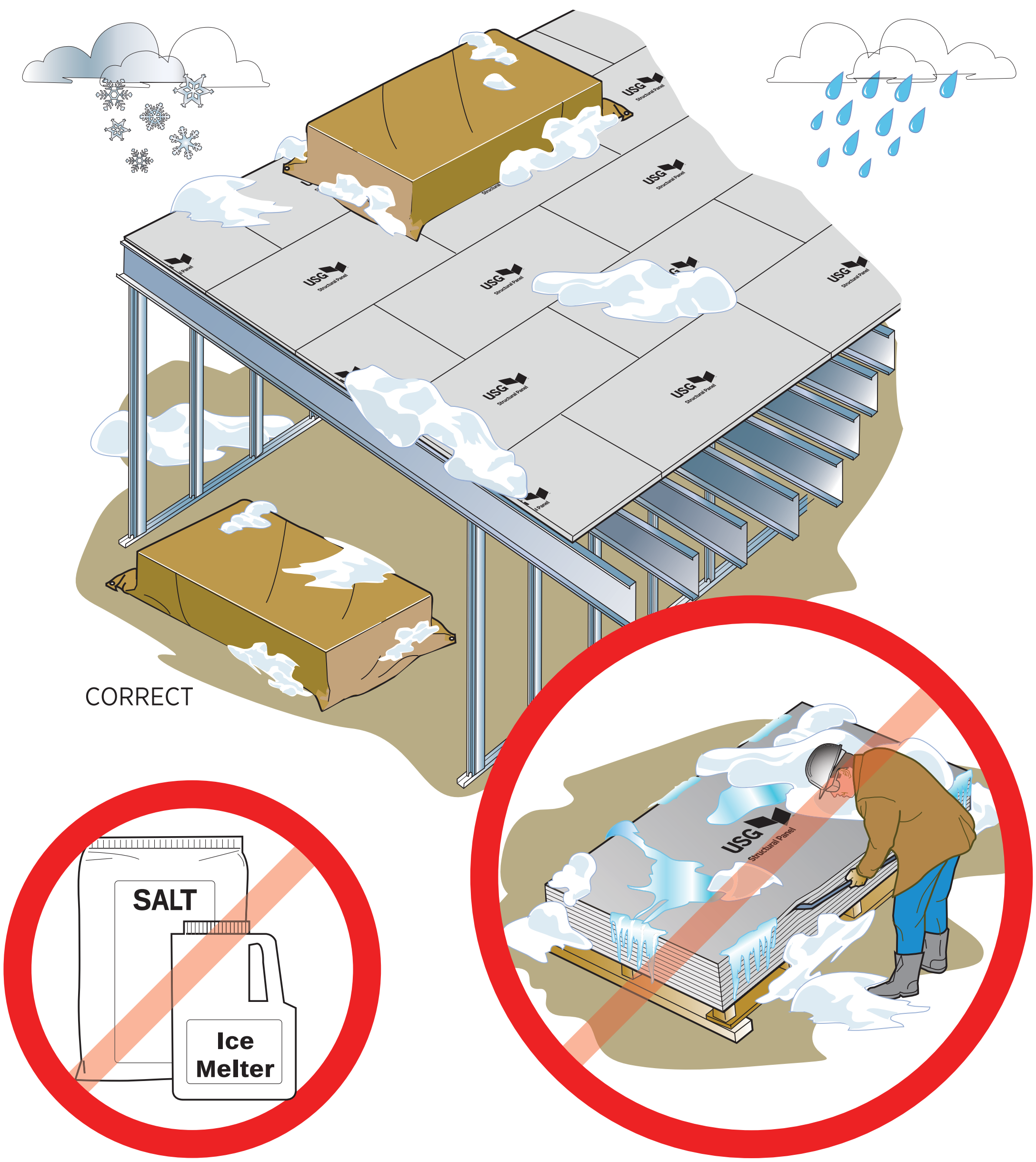
USG STRUCTURAL PANEL CONCRETE ROOF DECK PALLET PLACEMENT*

Note: *Loading must be verified by a structural engineer.



USG STRUCTURAL PANEL CONCRETE ROOF DECK
PROPER PALLET STORAGE

- Ensure unit covers are secure.
- Use plastic edge shovel for snow removal.
- Freezing may result in panels sticking together.
- Allow panels to thaw naturally if frozen.
- **Only use sand when iced over. Do not use salt, fertilizer or ice melt.**



CORRECT

INCORRECT

INCORRECT

NOTES

PRODUCT INFORMATION

See usg.com for the most up-to-date product information.

CUSTOMER SERVICE

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EMAIL

usgstructural@usg.com

WEBSITE

usg.com/structural

MANUFACTURED BY

United States Gypsum Company
550 West Adams Street
Chicago, IL 60661

MSRP BASED UPON FULL TRUCKLOAD DELIVERED TO JOBSITE:
ROOF DECK: $5.40/SF

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area and wear a NIOSH/MSHA approved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: Get medical attention. Store locked up. Dispose of in accordance with local, state and federal regulations.
For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

NOTICE
We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by applications of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within 30 days from date it was or reasonably should have been discovered.

SAFETY FIRST!
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

SCP43-USA-ENG/rev. 10-18

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USG Structural Solutions

SUBMITTAL SHEET

USG STRUCTURAL PANEL CONCRETE ROOF DECK

A concrete roof deck that can be combined with other noncombustible materials to create 1- and 2-hour fire-rated roof-ceiling assemblies.

- The only cementitious structural panel approved by Factory Mutual (FM) — FM Approval Standard 4472
- Strong, durable concrete panel; great uplift ratings
- Dimensionally stable; panel will not buckle or warp like wood sheathing; no moisture issues like structural concrete
- Installs fast and easy with appropriate dust collection
- Meets the criteria of active ASTM standard E136 for use in all types of noncombustible construction
- Made in the USA

DESCRIPTION

USG Structural Panel Concrete Roof Deck, also known as USG Structo-Crete® Panels, mechanically fastened to cold-formed steel joists, trusses or wood framing members; to create a structural substrate ideal as low- and steep-slope roof systems, canopies and/or balconies. This roof system is designed to carry gravity and lateral loads. Roof membranes may be applied directly over USG Structural Panel Concrete Roof Decks. For retrofit or renovation projects, Concrete Roof Deck can also be installed on wood-joists, trusses or bar joists. See ***USG Structural Recommended Fasteners (SCP95)***.

USG Structural Panel Concrete Roof Decks can carry a total load, live and dead, of 150 psf (7.2 kPa) on cold-formed steel framing is spaced 48 in. (1220mm) o.c.

USG Structural Panel Concrete Roof Decks have a linear variation with change in moisture content of less than 0.10%. This means that the panels will not buckle or warp like wood sheathing.

Cutting USG Structural Panel Concrete Roof Decks require a carbide-tipped saw blade and a circular saw equipped with dust collection or suppression and control of airborne dust. Fastening is also conventional, using a screw gun and self-drilling No. 8-gauge screws. Because these panels are so durable, they may be installed in most weather conditions, including mild precipitation (rain or snow) and temperatures from 0°F to 125°F (-18°C to 52°C).

Refer to roof system manufacturer's written instructions, local code requirements and Factory Mutual Global (FMG) and/or Underwriters Laboratories (UL) requirements for proper installation techniques. For the attachment of shingles, USG recommends the use of electro-galvanized collated roofing nails installed by a professional grade pneumatic nailer with an air supply between 100 to 120 psi.

FIRE PERFORMANCE

- UL Classified (Type USGSP) for noncombustibility in accordance with active ASTM standard E136 (CAN/ULC-S114)
- UL Classified (Type USGSP) as to Surface Burning Characteristics in accordance with ASTM E84 (CAN/ULC-S102). — Flame Spread 0 and Smoke Developed 0
- Class A, in accordance with UL790 (CAN/ULC-S107). See the *UL Building Materials Directory* for more information

SYSTEM PERFORMANCE

Description	Reference
FM Approved	Complies with requirements of FM 4472
Meets FM Class 1	
Code Report	PER-14076
Ultimate Uniform Load[a]	150psf (7.2kPa) @ 48" o.c. (1220mm). See Table
Shear Diaphragm Ratings	1641plf[b] (23.9kN/m)
UL 1-, 1.5-, 2-Hour Fire Resistance Designs	P561, P562, P573
UL Roofing System, Uplift Resistance	TGIK.R25352

(a) On steel framing.
(b) Joists spaced 48" (1219.2mm) o.c. and fasteners spaced 4" (102mm) o.c. at the perimeter and 12" (305mm) o.c. in field, fully blocked. See the Progressive Engineering Inc. Product Evaluation Report PER-14076.

FM APPROVED

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WARNING

USG Structural Panel Concrete Roof Decks should not be left in service without an appropriate roof, or weather-resistive membrane covering.

INSTALLATION

To perform in the expected manner, USG Structural Panel Concrete Roof Decks must be installed according to USG specifications, using only the listed materials and components. For a complete set of specifications, email usgstructural@usg.com.

As with all types of construction, appropriate safety procedures must be followed to protect installers from personal injuries resulting from lifting incorrectly, falling, and eye, hand and lung irritation.

Care must be taken when placing pallets of USG Structural Panel Concrete Roof Decks on roof framing. A pallet of USG Structural Panel Concrete Roof Decks consists of 20 sheets of our 3/4 in. x 4 ft. x 8 ft. panels (19mm x 1220mm x 2440mm) nominal [The T&G panels have an actual width of 47-3/4 in. (1213mm)], and weighs approximately 3,400 lbs. (1542 kg). Do not exceed limits when loading pallets or panels on open framing or completed roof assemblies. Store units next to structural walls where the joists meet the wall. See ***USG Structural Panel Concrete Roof Deck Field Installation Guideline (SCP43)*** for additional information.

RECOMMENDED FASTENERS

Refer to ***USG Structural Recommended Fasteners (SCP95)*** for specific fastener recommendations for the various types of framing used for installing USG Structural Panel Concrete Roof Deck. The recommended fasteners meet several criteria to insure they have adequate pull-out, pull-through, and slip performance. These fasteners also meet or exceed 1000 hours corrosion resistance requirement when tested in accordance with ASTM B117. High corrosion resistance is critical because of the panel pH level. When coupled with any moisture exposure, including high humidity, this elevated pH may deteriorate a non-corrosion resistant fastener.

General Note: In accordance with PER-14076, the minimum screw pattern is 6 in. (153 mm) o.c. along the perimeter of the panels and 12 in. (305 mm) o.c. in the field of the panels. Do not use a larger size screw unless specified by the structural engineer.

A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects.

FRAMING

The steel roof framing must be designed to meet the strength and deflection criteria specified in the contract documents. The attachment flange or bearing edge must be a minimum 1-5/8 in. (41mm) wide with at least 3/4 in. (19mm) of the panel bearing on the supporting flange. Metal framing must be a minimum 16 gauge (54 mils, or 0.0538 in. [1.36mm]) and spaced no greater than 48 in. (1220mm) o.c. Follow the contract documents and the steel framing manufacturer's recommendations for the proper installation and bracing of the framing.

TRAFFIC PROTECTION

Place sheathing materials (i.e. additional layer of USG Structural Panel or plywood) on the roof in high traffic areas to protect newly installed concrete roof decks. See ***USG Structural Panel Concrete Roof Deck Field Installation Guideline (SCP43)*** for additional information.

APPLICATION

Cut panels to size with a circular saw equipped with carbide-tipped blade and a dry dust collection device or a water-dispensing device that limits the amount of airborne dust. Wear safety glasses and a NIOSH-approved N95 dust mask when cutting this panel. Dispose of collected dust in a safe manner and in compliance with local, state and federal ordinances.

APPLICATION CONT.

Install USG Structural Panel Concrete Roof Decks with the long edges perpendicular to the framing. Apply the panel with the print markings facing up toward the installer. Fasten each panel after it has been placed following the fastening schedule listed in the contract documents. Install panels in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows. **Tongue and groove joints should be free of debris and fitted tightly without any gapping.** For all panels less than 24 in. (610mm) wide, all edges must be supported by blocking. Blocking must be cold-formed from steel complying with AISI General, with a minimum 54 mils (0.0538 inch or 1.36mm) base metal thickness (no. 16 gauge) and a minimum G60 galvanized coating. The attachment flange or bearing edge must be at least 1-5/8 in. (41mm) wide and at least 3/4 in. (19mm) of the panel must bear on the supporting flange or edge. See ***USG Structural Panel Concrete Roof Deck Field Installation Guideline (SCP43)*** for additional information.

Installed panels shall not be exposed to weather for more than 90 days. Care must be taken to avoid accumulation of snow and/or ice on installed panels. Brooms should be used for snow removal whenever possible. Excessive shoveling or scraping may damage installed panel surface.

In the event of significant accumulations of snow and/or ice, use indirect heat from temporary space heaters to melt the affected areas. To prevent damage to USG Structural Panel Concrete Roof Decks, never expose the panels to direct flame for the purpose of snow removal and/or deicing efforts. At no time should salts, fertilizers or other chemicals be used on the panels for anti-icing and/or deicing purposes.

ROOFING SYSTEM

Follow the contract documents and the roof system manufacturer's recommendations for the application of roof materials. Before the application of roof materials, ensure that all panels are properly fastened, with the fastener head driven flush or slightly below the surface of the panels.

PRODUCT DATA

Sizes and Packaging: 3/4 in. x 4 ft. x 8 ft. (19 mm x 1220 mm x 2440 mm) panels. Each panel weighs approximately 170 lbs. (77kg) and is intended to be handled by two people. USG Structural Panel Concrete Roof Decks are packaged in 20-piece units.

Availability: USG Structural Panel Concrete Roof Decks are sold through any USG distributor. Email usgstructural@usg.com for information on availability and a dealer in your area.

Storage: USG Structural Panel Concrete Roof Decks are shipped in 20-piece units. Panels should be stored in a horizontal position and uniformly supported. Panels must be covered when stored in unprotected areas.

Excessive moisture and freezing temperatures may result in panels sticking together within the units. Therefore, care should be taken to ensure units of USG Structural Panel Concrete Roof Decks are not exposed to excessive moisture, ice and snow. In the event that panels do become frozen together within a unit, the unit needs to be brought to a temperature above 32°F (0°C) to allow the ice to melt naturally. Never physically pry panels apart. Salt, fertilizer or other deicing agents should not be used at any time. Covering the units completely with tarps or similar coverings is an easy way to avoid panels freezing together.

Maintenance: USG Structural Panel Concrete Roof Decks do not require any regular maintenance except to remove standing water and repair damage from abuse. Any cracked or broken panels should be replaced with sound USG Structural Panel Concrete Roof Decks that are secured following the fastening schedule prescribed in the original installation documents. The replacement panels must be a minimum of 24 in. (610mm) wide and must span a minimum of two supports. If not, the replacement panel must be fully blocked on all sides. See ***USG Structural Panel Concrete Roof Deck Field Installation Guideline (SCP43)*** for additional information.

TEST DATA

Physical and Mechanical Properties	Test Standard	Typical Values Standard (Metric)
Noncombustibility	ASTM E136 (unmodified) CAN/ULC-S114	Passed
Surface-burning characteristics (flame spread/smoke developed)	ASTM E84 CAN/ULC-S102	0/0
Weight at 3/4 in. (19 mm) thickness	ASTM D1037	5.3 lbs./ft.^{2} (26 kg/m^2)
Density[a]	ASTM C1185	75 lbs./ft.^{3} (1,201 kg/m^3)
Mold resistance	ASTM D3273 ASTM G21	10 0
Termite resistance	AWPA Standard E1-13	9.8
Low VOC emissions	CDPH/EHLB/Standard Method V1.1-2010[b]	Compliant

TEST DATA CONT.

Physical and Mechanical Properties	Test Standard	Typical Values Standard (Metric)
Concentrated load	ASTM E661	550 lbs. (2.45 kN) static 0.108 in. (2.7mm) max. deflection @ 200 lbs. (0.89 kN)
Fastener lateral resistance[c]	ASTM D1761, Sec. 10.2	>210 lbs. (0.93 kN) dry >160 lbs. (0.71 kN) wet
pH value	ASTM D1293	10.5
Linear variation with change in moisture (25% to 90% relative humidity)	ASTM C1185, Sec. 8	<0.10%
Thickness swell	ASTM D1037, B	Max. 3.0%
Freeze/thaw resistance	ASTM C1185	Passed (50 cycles)
Water absorption[d]	ASTM C1185, Sec. 5.2.3.1	<15.0%
Long-term durability	ASTM C1185, Sec. 13	Min. 75% retention of physical properties
Water durability	ASTM C1185, Sec. 5	Min. 70% retention of physical properties

(a) Density measured at equilibrium conditioning per Section 5.2.3.1., 28 days after manufacturing.
(b) Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010 (Emission testing method for CA Specification 01350).
(c) Fastener lateral resistance measured with #8, 1-5/8 in. (41mm), winged, self-drilling screw.
(d) Absorption measured from equilibrium conditioning followed by immersion in water for 48 hours.

LOAD TABLE

The following table represents the Load Capacity of USG Structural Panel Concrete Roof Decks. The uplift capacities in this table represent the attachment of the Concrete Roof Deck to the structural framing members. The values for a roofing system are obtained from the roofing system manufacturer's testing and specific installation instructions. For the most up-to-date load tables, see the Progressive Engineering Inc. report, PER-14076. For technical questions, email usgstructural@usg.com. **A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects.**

Ultimate Load Capacity for USG Structural Panel Concrete Roof Deck

Joist Spacing - inches (mm)	Uniform Load - psf (kPa)[1,2,3]	Uplift Capacity – psf (kPa)[1,2,3]			
		Fastener spacing (edge/field)			
		8/12	8/8	6/6	4/4
12 inch (304.8mm)	1320 (63.2)	513 (24.6)	770 (36.9)	1026 (49.1)	1320 (63.2)
16 inch (406.4mm)	744 (35.6)	385 (18.4)	557 (27.6)	744 (35.6)	744 (35.6)
24 inch (609.6mm)	330 (15.8)	257 (12.3)	330 (15.8)	330 (15.8)	330 (15.8)
32 inch (812.8mm)	240 (11.5)	192 (9.19)	240 (11.5)	240 (11.5)	240 (11.5)
48inch (1219mm)[4]	150 (7.2)	128 (6.1)	150 (7.2)	150 (7.2)	150 (7.2)

For SI: 1 inch = 25.4mm, 1 psf = 47.88 Pa.
(1) **Ultimate Load Values have no safety factor included.**
(2) Two framing spans minimum per panel piece.
(3) Ultimate Uniform Load Table for general reference only.
For complete load capacities, consult Progressive Engineering Inc. Product Evaluation Report PER-14076
(4) Blocking at all joints perpendicular to framing to be a minimum of 16 gauge (54 mils, or 0.0538 inch [1.37 mm]), 3-5/8 in (92 mm) wide track. For sheathing installation where a single span condition exists, additional track blocking is required perpendicular to the framing located mid-way between the edges of the panel.

SUBMITTAL APPROVALS

Job Name	
Contractor	Date

PRODUCT INFORMATION
See usg.com for the most up-to-date product information.

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area, wear a NIOSH/MSHAapproved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: Get medical attention. Store locked up. Dispose of in accordance with local, state, and federal regulations. For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

NOTICE
We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

SAFETY FIRST!
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protection equipment. Read SDS and literature before specification and installation.

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USG STRUCTURAL PANEL
CONCRETE SUBFLOOR

A concrete subfloor that can be combined with other noncombustible materials to create 1-, 2- and 3-hour fire-rated floor-ceiling assemblies.

- Strong, durable concrete panel
- Dimensionally stable; panel will not buckle or warp like wood sheathing
- Installs like wood sheathing; circular saw for cutting, screws for fastening
- Meets the criteria of active ASTM standard E136 for use in all types of noncombustible construction

DESCRIPTION

USG Structural Panel Concrete Subfloor, also known as USG Structo-Crete® Panels, mechanically fastened to cold-formed steel joists, trusses or other framing members. A noncombustible ceiling assembly is attached to the bottom of the floor joists to complete the construction.

USG Structural Panel Concrete Subfloor can carry a total load, live and dead, of 120 psf (5.8 kPa) when support framing is spaced 24″ (610 mm) o.c. Floor diaphragm design capacities up to 1,468 plf (21.4 kNm) allow this panel to be used as a shear diaphragm in the structural design of the building.

Cutting the concrete subfloor requires a standard framing, carbide-tipped saw blade and a circular saw equipped with dust collection or suppression to control airborne dust. Fastening is also conventional, using a screw gun and self-drilling, corrosion resistant, fasteners. Refer to ***USG Structural Recommended Fasteners (SCP95)*** for details. Because these panels are so durable, they may be installed in most weather conditions, including mild precipitation (rain or snow), and temperatures from 0°F to 125°F (-18°C to 52°C).

LIMITATIONS

- USG Structural Panel Concrete Subfloor is not intended for use on balconies, roofs, or other exterior applications. Only to be used in protected interior locations.
- USG Structural Panel Concrete Subfloors should not be left in service without an appropriate floor covering such as ceramic tile, vinyl, wood, carpet or other approved materials.
- Adhesive application of floor covering directly to the panel is not recommended as future removal may damage the USG Structural Panel subfloor.
- Use of an underlayment is recommended under all flooring coverings except carpet and pad.
- Do not gap USG Structural Panels.
- Panel layout should be designed to minimize cutting and ensure that all square cut ends and panel openings greater than 6″ in any direction are supported by appropriate framing.
- A qualified engineer should review and approve calculations, framing, and fastener spacing for all projects.

INSTALLATION

To perform in the expected manner, USG Structural Panel Concrete Subfloor must be installed according to USG specifications, using only the listed materials and components. For a complete set of specifications, email usgstructural@usg.com.

As with all types of construction, appropriate safety procedures must be followed to protect installers from personal injuries resulting from lifting incorrectly, falling, and eye, hand and lung irritation from dust.

Care must be taken when placing pallets of USG Structural Panel Concrete Subfloor on floor framing. A pallet of USG Structural Panel Concrete Subfloor, 20 sheets, 3/4″ x 4′ x 8′ (19 mm x 1,220 mm x 2,440 mm) weighs approximately 3,400 lb. (1,542 kg). Do not exceed floor limits when loading pallets or panels on open framing or completed floor assemblies. Store units next to structural walls where the joists meet the wall. See ***USG Structural Panel Concrete Subfloor Field Installation Guideline (SCP14)*** for additional information.

FRAMING

The steel floor framing must be designed to meet the strength and deflection criteria specified in the contract documents. The attachment flange or bearing edge must be a minimum 1-5/8″ (41 mm) wide, with at least 3/4″ (19 mm) of the panel bearing on the supporting flange. The size of the framing flange required will vary based on the specified mil thickness/gauge and fastener selected. Metal framing must be a minimum 43 mil (18 gauge) and spaced no greater than 24″ (610 mm) o.c. When significant diaphragm capacity is required, 54 mil (16 gauge) may be required. Follow the contract documents and the steel framing manufacturer's recommendations for the proper installation and bracing of the framing.

INSTALLATION CONT.

RECOMMENDED FASTENERS

Refer to ***USG Structural Recommended Fasteners (SCP95)*** for specific fastener recommendations for the various types of framing used for installing USG Structural Panel Concrete Subfloor. The recommended fasteners meet several criteria to insure they have adequate pull-out, pull-through, and slip performance. These fasteners also meet or exceed 1000 hours corrosion resistance requirement when tested in accordance with ASTM B117. High corrosion resistance is critical because of the panel pH level. When coupled with any moisture exposure, including high humidity, this elevated pH may deteriorate a non-corrosion resistant fastener.

General Fastener Notes: In accordance with PER-13067, the minimum screw pattern is 6 in. (153 mm) o.c. along the perimeter of the panels and 12 in. (305 mm) o.c. in the field of the panels. Do not use a larger size screw unless specified by the structural engineer.

A qualified architect or engineer should review and approve calculations, framing and fastener spacing for all projects.

TRAFFIC PROTECTION

Place sheathing materials (i.e. additional layer of USG Structural Panel or min 3/8 in [10 mm] plywood) on the floor in high traffic areas to protect newly installed concrete subfloors. See ***USG Structural Panel Concrete Subfloor Field Installation Guideline (SCP14)*** for additional information.

APPLICATION

Cut panels to size with a circular saw equipped with standard framing carbide-tipped blade and a dry dust collection device or a water-dispensing device that controls the amount of airborne dust. Wear safety glasses and a NIOSH-approved N95 dust mask when cutting this panel. Dispose of collected dust in a safe manner and in compliance with local, state and federal ordinances.

Install USG Structural Panel Concrete Subfloor with the long edges perpendicular to the framing. Apply the panel with the print markings facing up toward the installer. Fasten each panel after it has been placed following the fastening schedule listed in the contract documents. The use of adhesives in addition to screw attachment is not required. Install panels in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows, except where panels less than 8 ft (2440 mm) are used, an offset of one framing member is allowed. Tongue and groove joints should be free of debris and fitted tightly without any gapping. For all panels less than 24" (610 mm) wide, all edges must be supported by blocking. Blocking must be cold-formed from steel complying with AISI-General, with a minimum 54 mils (0.0538 inch or 1.37 mm) base metal thickness (No.16 gauge) and a minimum G60 galvanized coating. The attachment flange or bearing edge must be at least 1-5/8" (41 mm) wide and at least 3/4" (19 mm) of the panel must bear on the supporting flange or edge. The size of the framing flange required will vary based on the specified mil thickness/gauge and fastener selected. See ***USG Structural Panel Concrete Subfloor Field Installation Guideline (SCP14)*** for additional information.

Installed panels shall not be exposed to weather for more than 90 days. Care must be taken to avoid accumulation of snow and/or ice on installed panels. Brooms or leaf blowers should be used for snow removal whenever possible. Excessive shoveling or scraping may damage installed panel surface.

In the event of significant accumulations of snow and/or ice, use indirect heat from temporary space heaters to melt the affected areas. To prevent damage to USG Structural Panel Concrete Subfloor, never expose the panels to direct flame for the purpose of snow removal and/or de-icing efforts. At no time should salts, fertilizers or other chemicals be used on the panels for anti-icing and/or de-icing purposes.

FLOOR FINISH

Follow the contract documents and the floor finish manufacturer's recommendations for the application of finished flooring. Note that most floor finishes will require an underlayment. Before the application of floor finish materials, ensure that all panels are properly fastened, with the fastener head driven flush or slightly below the surface of the panels.

CEILING CONSTRUCTION

For fire- and sound-rated assemblies, the installed ceiling must comply with the UL-listed Design and USG recommendations. Follow the contract documents and the ceiling manufacturer's instructions for the ceiling installations. A USG Sheetrock® Brand Firecode® C Panels (UL Type C), USG Sheetrock® Brand EcoSmart Panels Firecode® (UL Type ULIX™) or a plaster ceiling should be applied to resilient channels that are fastened to the joists. A drywall or acoustical suspended ceiling system may also be used to enhance sound performance. For a complete list of UL designs visit USGStructuralUL.com or see the ***USG Structural Fire and Acoustic Manual (SCP100)***.

PRODUCT DATA

Sizes and Packaging: 3/4" x 4' x 8' (19 mm x 1,220 mm x 2,440 mm) panels. Each panel weighs approximately 170 lb. (77 kg) and is intended to be handled by two people. USG Structural Panel Concrete Subfloor are packaged in 20 piece units.

Availability: USG Structural Panel Concrete Subfloor is sold through any USG distributor. Email usgstructural@usg.com for information on availability and a dealer in your area.

Storage: USG Structural Panel Concrete Subfloor is shipped in 20 piece units. Panels should be stored in a horizontal position and uniformly supported. Panels must be covered when stored in unprotected areas.

Excessive moisture and freezing temperatures may result in panels sticking together within the units. Therefore, care should be taken to ensure units of USG Structural Panel Concrete Subfloor are not exposed to excessive moisture, ice and snow. In the event that panels do become frozen together within a unit, the unit needs to be brought to a temperature above 32°F (0°C) to allow the ice to melt naturally. Salt, fertilizer or other de-icing agents should not be used at any time. Covering the units completely with tarps or similar coverings is an easy way to avoid panels freezing together.

Maintenance: USG Structural Panel Concrete Subfloor does not require any regular maintenance except to remove standing water and repair damage from abuse. Any cracked or broken panels should be replaced with sound USG Structural Panel Concrete Subfloor that are secured following the fastening schedule prescribed in the original installation documents. The replacement panels must be a minimum of 24" (610 mm) wide and must span a minimum of two supports. If not, the replacement panel must be fully blocked on all sides. See ***USG Structural Panel Concrete Subfloor Field Installation Guideline (SCP14)*** for additional information.

Repairs: Installed USG Structural Panel Concrete Subfloor with T&G damage up to 10% of the edge length may be repaired using the recommendations located in ***USG Structural Panel Concrete Subfloor Repair Manual (SCP76)***. Panels with more significant damage shall be replaced.

TEST DATA

Physical and Mechanical Properties	Test Standard (Min. Values)	Test Values Standard (Metric)
Concentrated load	ASTM E661 (550 lb., .108")	804 lb. (3.58 kN) static 0.066" (1.7 mm) max. deflection @ 200 lb. (0.89 kN)
Fastener lateral resistance[A]	ASTM D1761, Sec. 10.2 (dry >210 lbf, wet >160 lbf)	776 lbf (3.45 kN) dry 800 lbf (3.56 kN) wet
Density[B]	ASTM C1185 (75 lb./ft^3)	78.6 lb./ft^3 (1,258 kg/m^3)
Weight at 3/4" (19 mm) thickness	ASTM D1037	5.3 lb./ft^2 (26 kg/m^2)
pH value	ASTM D1293	10.5
Linear variation with change in moisture (25% to 90% relative humidity)	ASTM C1185, Sec. 8 (<.10%)	0.06 %
Thickness swell	ASTM D1037, B (≤3.0%)	0.04 %
Freeze / thaw resistance	ASTM C1185 (75%)	100% properties retention
Mold resistance	ASTM D3273 (10) ASTM G21 (≤1)	10 0
Water absorption[C]	ASTM C1185, Sec. 5.2.3.1 (<15%)	9.0 %
Noncombustibility	ASTM E136 (unmodified) CAN/ULC-S114	Passed Passed
Surface-burning characteristics (flame spread/smoke developed)	ASTM E84 (0/0) CAN/ULC-S102 (0/0)	0/0 0/0
Long-term durability	ASTM C1185, Sec. 13 (75%)	100% properties retention
Water durability	ASTM C1185, Sec. 5 (70%)	83% properties retention
Termite resistance	AWPA Standard E1-13	9.8
Low VOC emissions	CDPH/EHLB/Standard Method V1.1-2010[D]	Compliant

(A) Fastener lateral resistance measured with #8, 1-5/8" (41 mm) Hi-Low screw.
(B) Density measured at equilibrium conditioning per Section 5.2.3.1., 28 days after manufacturing.
(C) Absorption measured from equilibrium conditioning followed by immersion in water for 48 hours.
(D) Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010 (Emission testing method for CA Specification 01350).

SYSTEM PERFORMANCE

Description	Reference
Code Reports	ICC ESR-1792; PER-13067
City Code Approvals	Los Angeles: LARR # 25682
Ultimate Uniform Load (total DL and LL)	Refer to PER-13067
Shear Diaphragm Ratings	1,468 plf (21.4 kNm)[A]
UL 1-, 1.5-, 2-Hour Fire Resistance Designs[C]	G535, G536, G556, G557, G558, G562, G588, L521, L541, L550, L569, L570, M502, M506, M515, M521, M527, H505, H501™
ULC 1-,1.5-, 2-Hour Fire Resistance Designs[C]	I526, I527, I528, I529, M520, M521
UL 2-, 3-Hour Load-Bearing Walls[C]	V465, V471
UL/ULC Metal and Plastic Through-Penetration Firestop Systemsc	F-E-1023, F-E-1032, F-E-2045,
Acoustical Ratings	>65 IICb >56 STC b

(A) Joists spaced 24″ (610 mm) o.c. and fasteners spaced 6″ (153 mm) o.c. at the perimeter and 12″ (305 mm) o.c. in field, blocked. See the Progressive Engineering Inc. Product Evaluation Report PER-13067.

(B) Carpet and pad over USG Structural Panel Concrete Subfloor attached to cold-formed steel framing with a ceiling consisting of resilient channels spaced 12″ (305 mm) o.c., 3-1/2″ (89 mm) of fiberglass insulation in the joist cavity and a single layer of 5/8″ (16 mm) USG Sheetrock® Brand Firecode® C Gypsum Panel gypsum panel.

(C) For the most up-to-date UL/ULC Designations, visit USGStructuralUL.com.

LOAD TABLE

For the most up-to-date load tables, see the Progressive Engineering Inc. Product Evaluation Report PER-13067 (www.PER13067.com), or for technical questions, email usgstructural@usg.com.

SUBMITTAL APPROVALS

Job Name	
Contractor	Date

PRODUCT INFORMATION
See usg.com for the most up-to-date product information.

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area, wear a NIOSH/MSHA-approved respirator. Wear protective gloves/ protective clothing/eye protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: Get medical attention. Store locked up. Dispose of in accordance with local, state, and federal regulations. For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

TRADEMARKS
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SAFETY FIRST!
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

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SAMPLES, LITERATURE AND PRODUCT INFORMATION

usg.com/structural

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USG Structural Solutions

USG STRUCTURAL PANEL RECOMMENDED FASTENERS

Fastening USG Structural Concrete Panels, also known as USG Structo-Crete™ Panels, properly to wood, cold-formed or hot-rolled steel framing is key to ensuring their long-term performance as a structural component. The recommended fasteners meet several criteria to insure they have adequate pull-out, pull-through, and slip performance. Furthermore, these fasteners meet or exceed 1000 hours corrosion resistance requirement when tested in accordance with ASTM B117. High corrosion resistance is critical because of the panel pH, and when coupled with any moisture exposure, including high humidity, this may deteriorate a non-corrosion resistant fastener.

Framing Type[1]	Min. End Distance[4]	Min. Flange Width	Fastener Manufacturer	Part Number	Fastener Description[5, 6, 7]
54-97 mil (16-12 ga) CFS[2]	1/2" [13mm]	1-5/8" [41mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" Winged Flat Wafer Head Self-Drilling Screw
			Simpson Strong-Tie Company, Inc.	CBSDQ158S	#8 x 1-5/8" Winged Self-Drilling Screw
33[3]-43 mil (20[3]-18 ga) CFS	1" [25mm]	2-5/8" [67mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" Winged Flat Wafer Head Self-Drilling Screw
SPF Lumber	5/8" [16mm]	1-7/8" [48mm]	Grabber Construction Products, Inc.	C8200L2M	#8 x 2" Flat Head Type 17 Nibs, GrabberGard
			Simpson Strong-Tie Company, Inc.	WSNTLG2S	#8 x 2" Flat Head Twin Threads Nibs
	1/2" [13mm]	1-5/8" [41mm]	SENCO Brands, Inc.	GL24AABF	8d Ring Shank Nails
118 mil (10 ga) CFS& 1/4" A36 A36 HRS	3/4" [19mm]	1-7/8" [48mm]	Simpson Strong-Tie Company, Inc	TBG1260S	#12 x 2-3/8" Flat Head, Strong-Drive® TB Wood-to-Steel Screw
			Muro North America, Inc.	RSM645WFL -GY	M6.0 x 45 mm Winged Self-Drilling Screw

Table Notes:

1. CFS = cold-formed structural steel; HRS = hot-rolled structural steel; Lumber = specific gravity 0.42 or greater. Gauge/thickness of steel, fastener min. end distance, and joist min. flange width is identified for each fastener. Project specific framing gauge, size and type is deter mined by the engineer, architect or design professional of record.
2. Cold-formed steel shall comply with AISI-General, with a minimum 54 mils or .0538-inch base metal thickness (No.16 gauge) and a minimum C60 galvanized coating.
3. 33 mil (structural 20 ga) is for gravity loads only.
4. Represents the minimum distance from the end (square cut) of the panel a fastener may be inserted.
5. Fastener pull-through is 581 lbs. (264 kg) and is the minimum average ultimate tested capacity for all tabulated fasteners.
6. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).
7. Any length of the approved fasteners may be used provided a minimum of 3 full threads penetrate the steel framing.
8. SENCO 8d ring shank nails are manufactured with a length of 2-3/8 in., head diameter of 0.266 in. and a shank diameter of 0.113 in. Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.

Notes:

- In accordance with code reports: PER-13067 for Subfloor, PER-14076 for Roof Deck, PER-15092 for Foundation Wall, and ESR-1792 for Subfloor.
- Use only fasteners recommended by USG and are corrosion resistant for use with USG Structural Panels to insure the system being installed will perform as expected as a structural component of your project.
- Install using the recommended spacing and distance from the ends (square cut) and edges (tongue & groove) of the panel.
- Do not use a larger diameter fastener unless specified by the design professional of record for the project.

Tips:

- Use a stand-up screw gun for ease of installation.
- Allow the gun and screw to do the work – don't force it.
- Change drive bits regularly.
- Fasteners should be set flush with the surface of the panel.
- Insert fasteners as close to vertical as possible.
- Do not use hex head screws on surfaces where USG Structural Panels will be applied to prevent panel damage. Use pan heads or similar.
- Clean stand-up gun head regularly with clean, dry air. No oil, graphite or other lubricants.

A qualified architect or engineer should review and approve calculations, framing, and fastener spacing for all projects.

PRODUCT INFORMATION
See usg.com for the most up-to-date product information.

DANGER
The following are warnings when installing the panels.Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area, wear a NIOSH/MSHA approved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: getmedical attention. Store locked up. Dispose of in accordance with local, state, and federal regulations.For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

USG.4YOU
800 (874-4968)
usg.com/structural

Manufactured by
United States Gypsum Company
550 West Adams Street
Chicago, IL 60661

MSRP based upon full truckload delivered to jobsite:
Subfloor: $4.50/sf
Roof Deck: $5.40/sf
Foundation Wall SD: $4.90/sf
Foundation Wall XD: $7.50/sf

SCP95-USA-ENG/rev. 4-19

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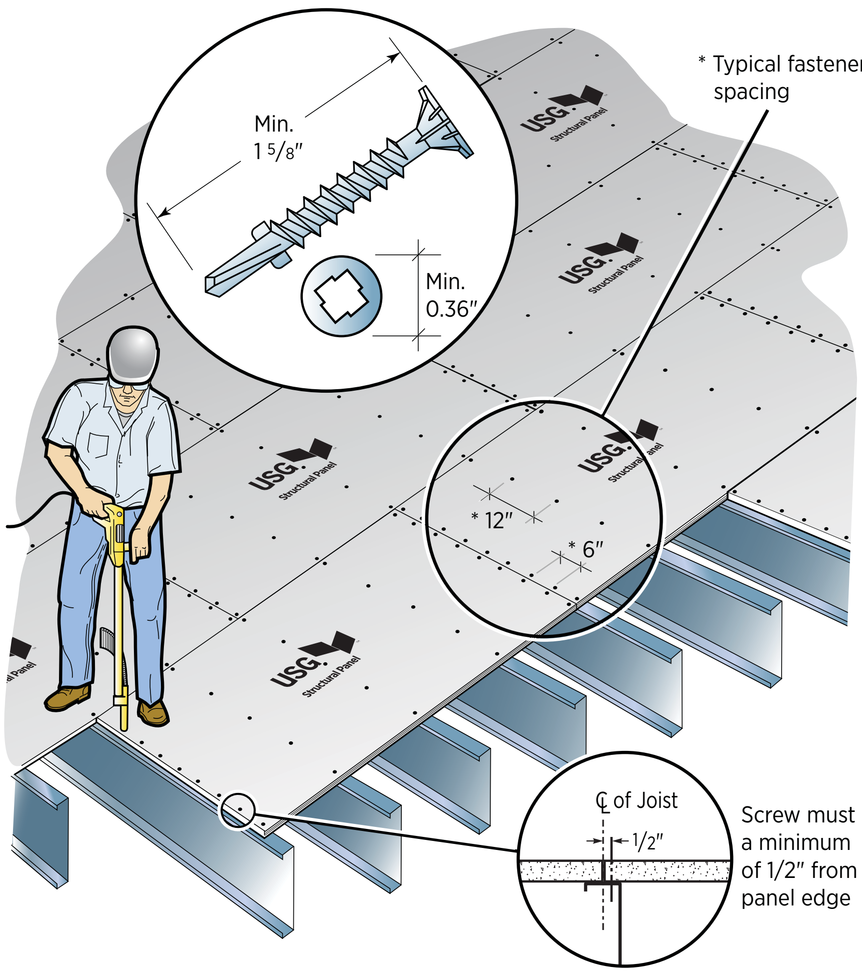
USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL LAYOUT BASICS

- T&G must run perpendicular to framing
- Every non-T&G joint must be supported by framing.
- Any panel not at least 24″ wide must be supported by katz blocking or fall on framing member.
- Every panel must span 2 frame openings, falling on 3 framing members.
- Firmly engage T&G edges and butt panel ends together prior to fastening.
- Panels must bear a minimum of 3/4″ on framing.
- Damaged ends and edges up to 10% of their length may be repaired per SCP76 USG Structural Panel Concrete Subfloor Repair Manual (www.USG.com/StructuralRepairManual)

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL FASTENING

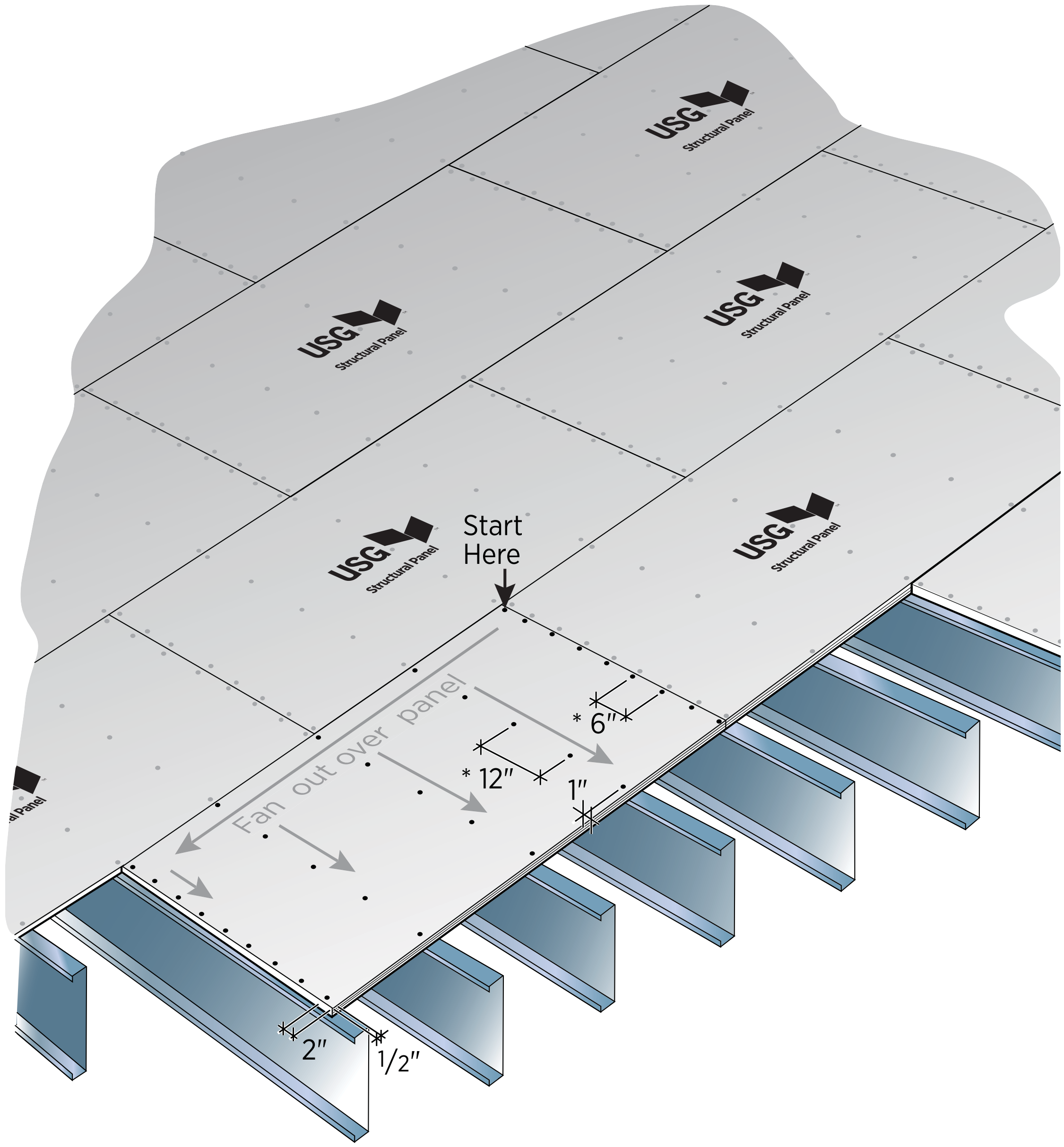
- Use only USG recommended fasteners
- Proper fall restraint equipment required
- Use only #8 screw with 1-5/8″ (41 mm) joist flange
- Apply screws with a stand-up gun to reduce fatigue
- Follow fastening schedule in contract documents

Note: *Fastener schedule is to be specified by designer of record.



USG STRUCTURAL PANEL CONCRETE SUBFLOOR
FASTENING THE PANEL

Note: *Fastener schedule is to be specified by designer of record.



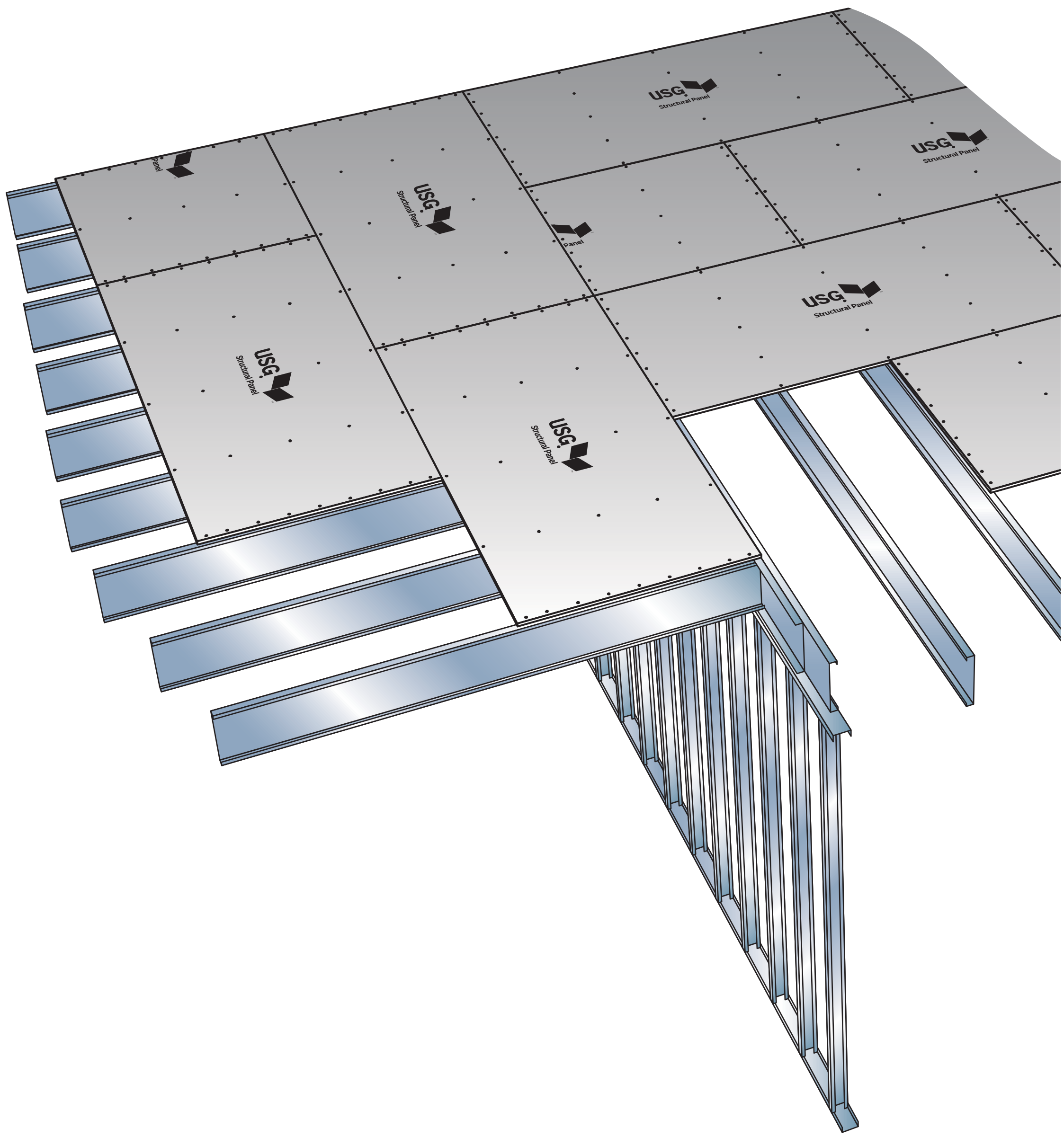
When connecting the tongue and groove, the tongue from the loose panel should be engaged into the groove of the already affixed panel.

To ensure proper panel application, be sure to:

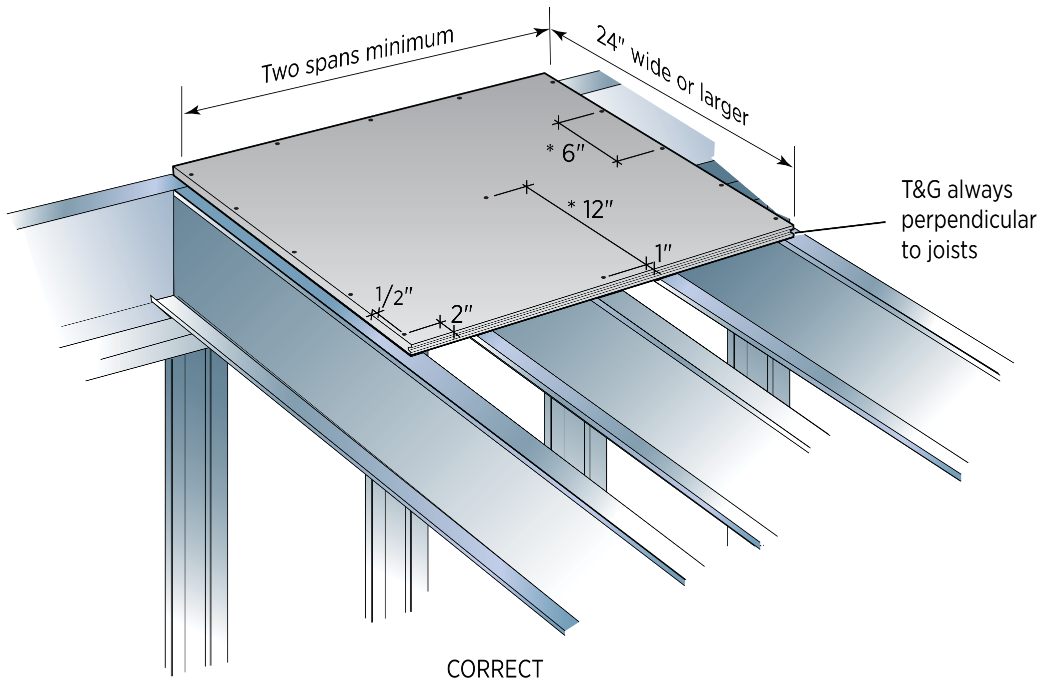
1. Lay board down adjacent to already fastened panel, careful to not damage T&G.
2. Butt square cut ends firmly together.
3. Engage T&G.
4. Fasten one corner and fan out over entire panel.
5. Fastener inset will vary based on the selected fasteber but must be a minimum of 1/2″ in from square cut ends and 1″ in from T&G edges.

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
FRAMING DIRECTION CHANGE

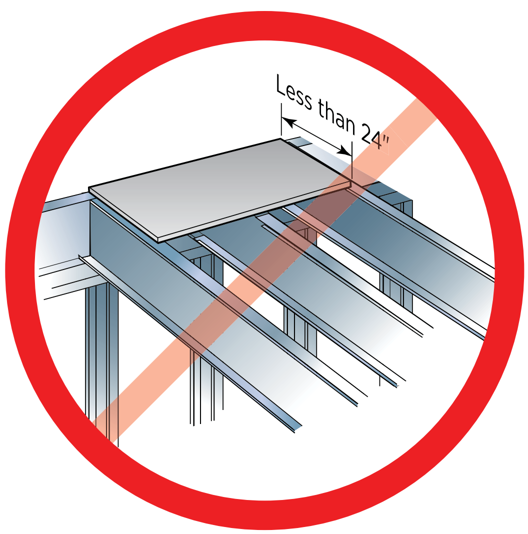
• Always lay panels perpendicular to supporting joists.



USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL LAYOUT: TWO-SPAN CONDITION



CORRECT



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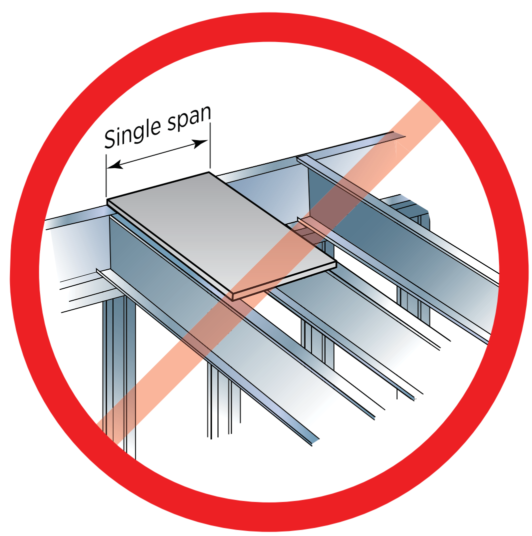


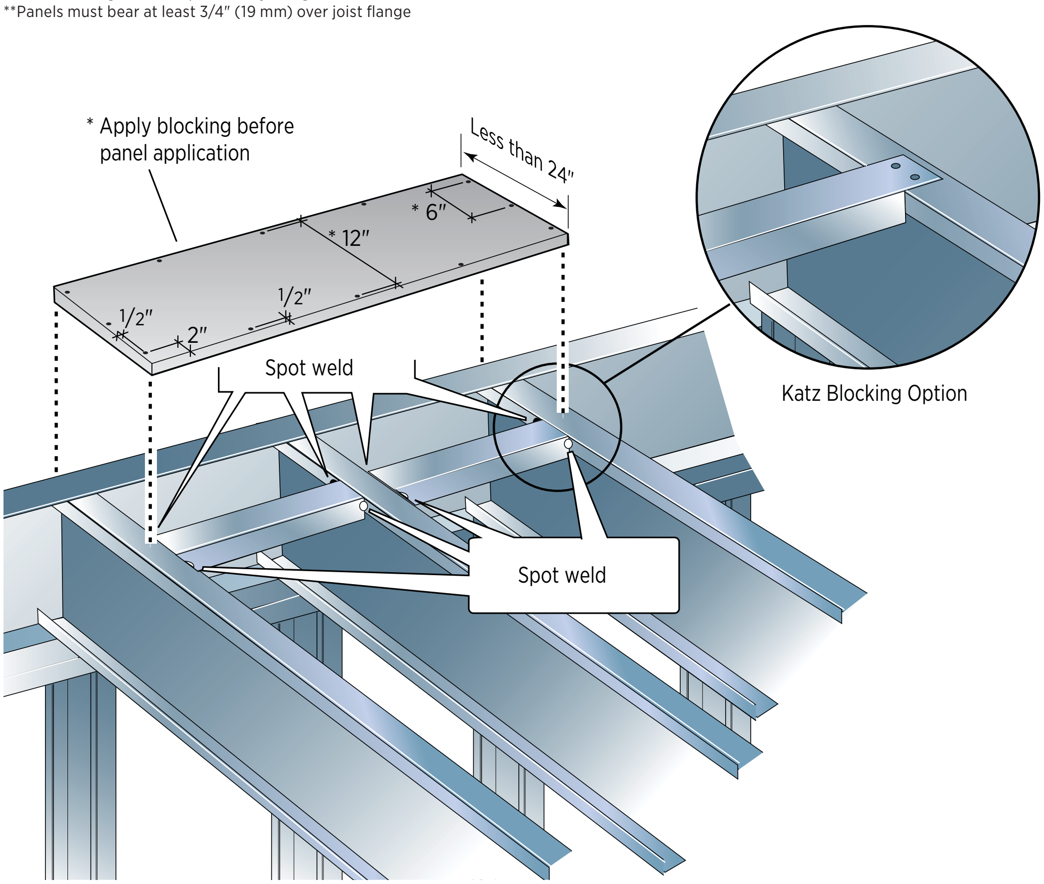
INCORRECT

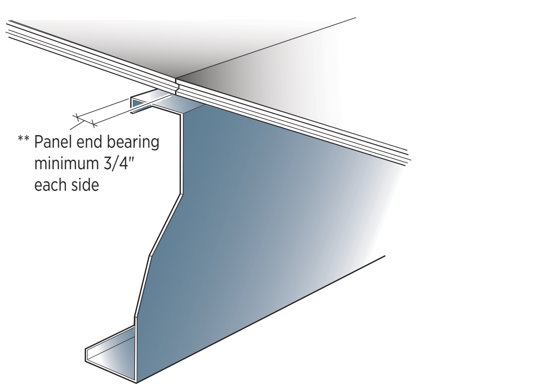
See Panel Blocking—Page 9

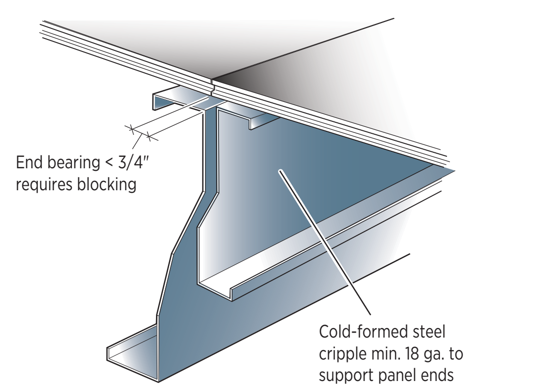
USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL BLOCKING

- Block edges that are less than 24″ (610 mm) wide
- Spot weld method used with structural stud blocking is only intended to hold stud in place until panel is fastened through it.
- Field welding to cold-formed framing members must be performed by certified welder and approved by structural engineer of record
- Katz blocking is not fastened independently. Position katz blocking evenly between adjacent panels, place panels over blocking and framing, and fasten through the panel & blocking into joist with a recommended fastener.

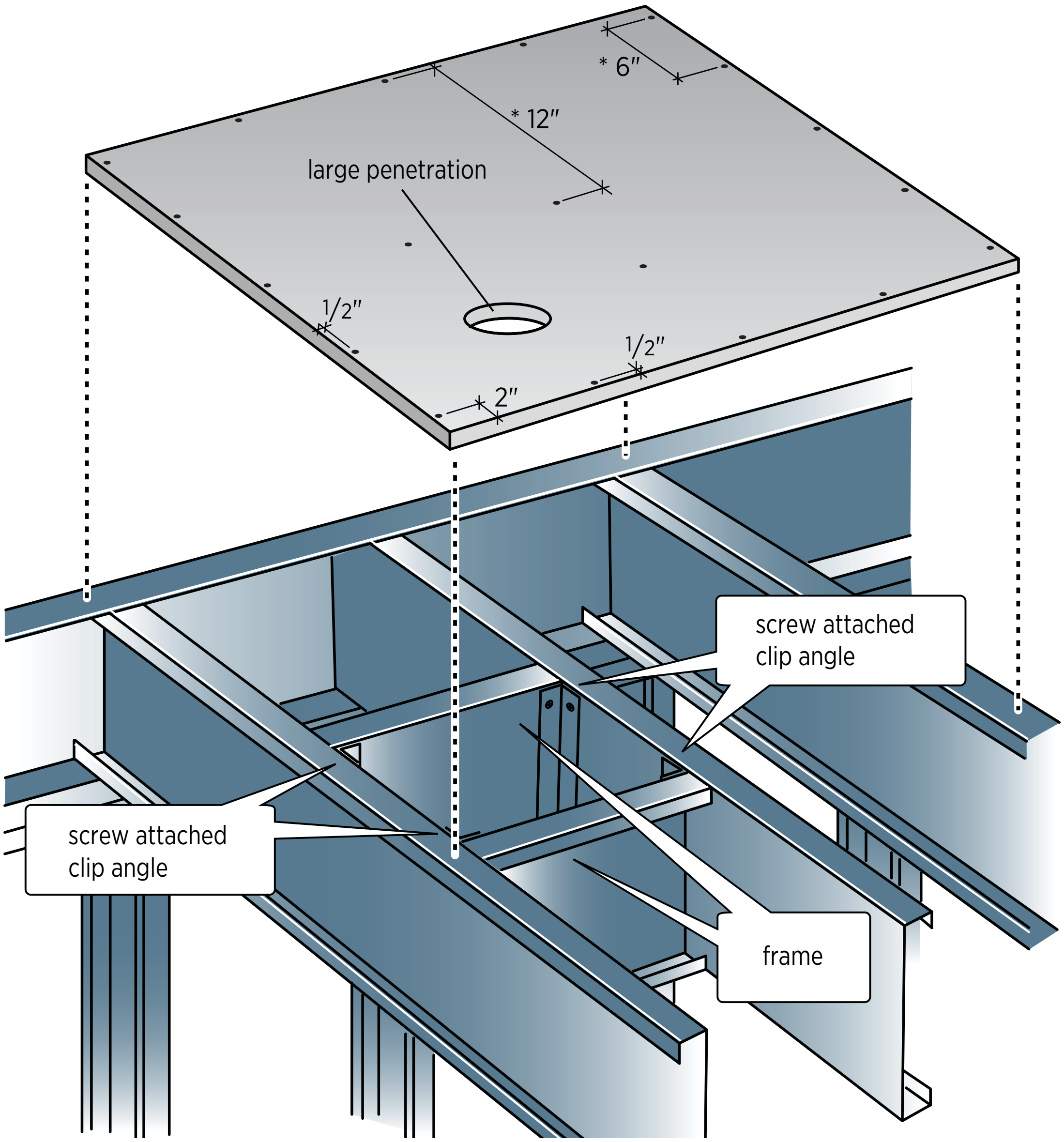
Note:
*Panel Blocking must be specified by designer of record.
**Panels must bear at least 3/4″ (19 mm) over joist flange







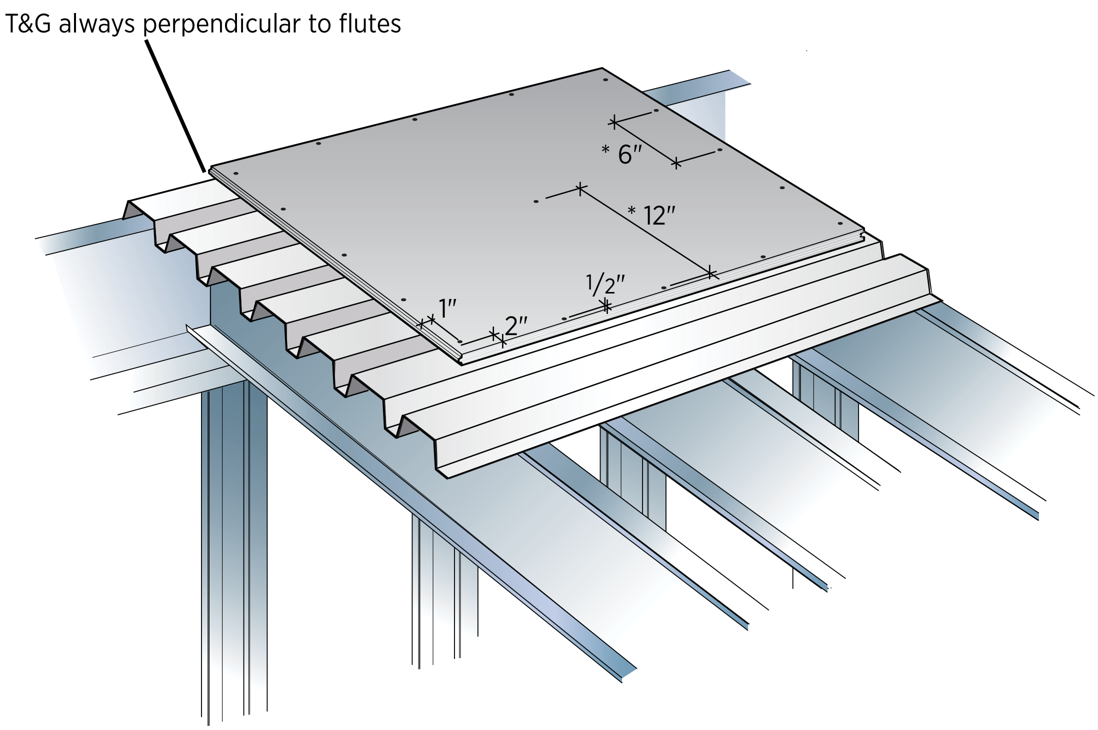
USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL PENETRATION

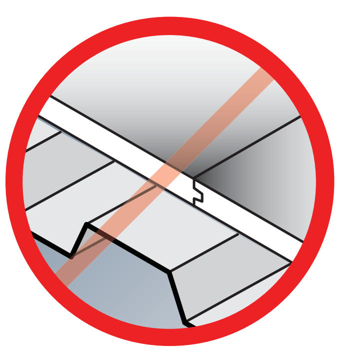


Unreinforced Penetrations	Reinforced Penetrations
• Unreinforced penetrations are limited to a maximum dimension of 6″ (153 mm) and do not require supplemental framing or engineer analysis. • Unreinforced penetrations are generally small openings through decks to accommodate lightly loaded plumbing/electrical runs.	• An opening of any shape with a dimension in any direction greater than 6″ (153 mm) requires reinforcement at the perimeter of the opening. • The framing at reinforced penetrations, as a minimum, must have an equal profile and capacity as the adjacent primary framing (joists) members. • The maximum penetration dimension is not limited to a single opening, but also includes group effect of multiple, closely spaced openings.

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL LAYOUT: OVER FLUTED DECK

- The concrete subfloor on fluted deck is always considered an underlayment
- The concrete subfloor is not considered a structural component in this application.
- There is no composite action between fluted deck and the concrete subfloor





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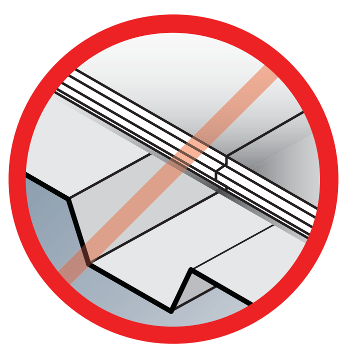

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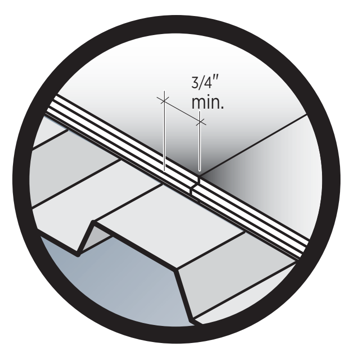
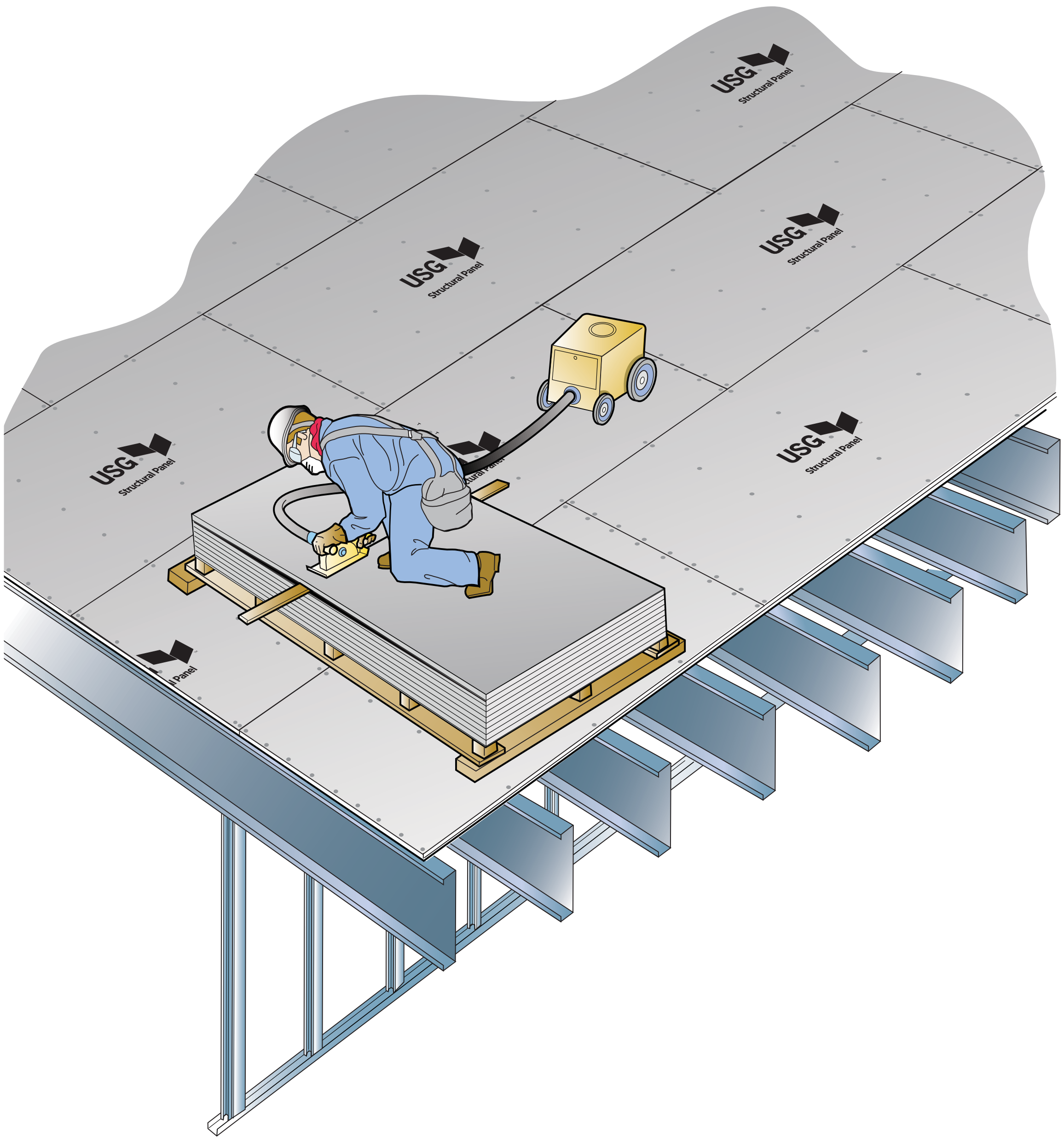


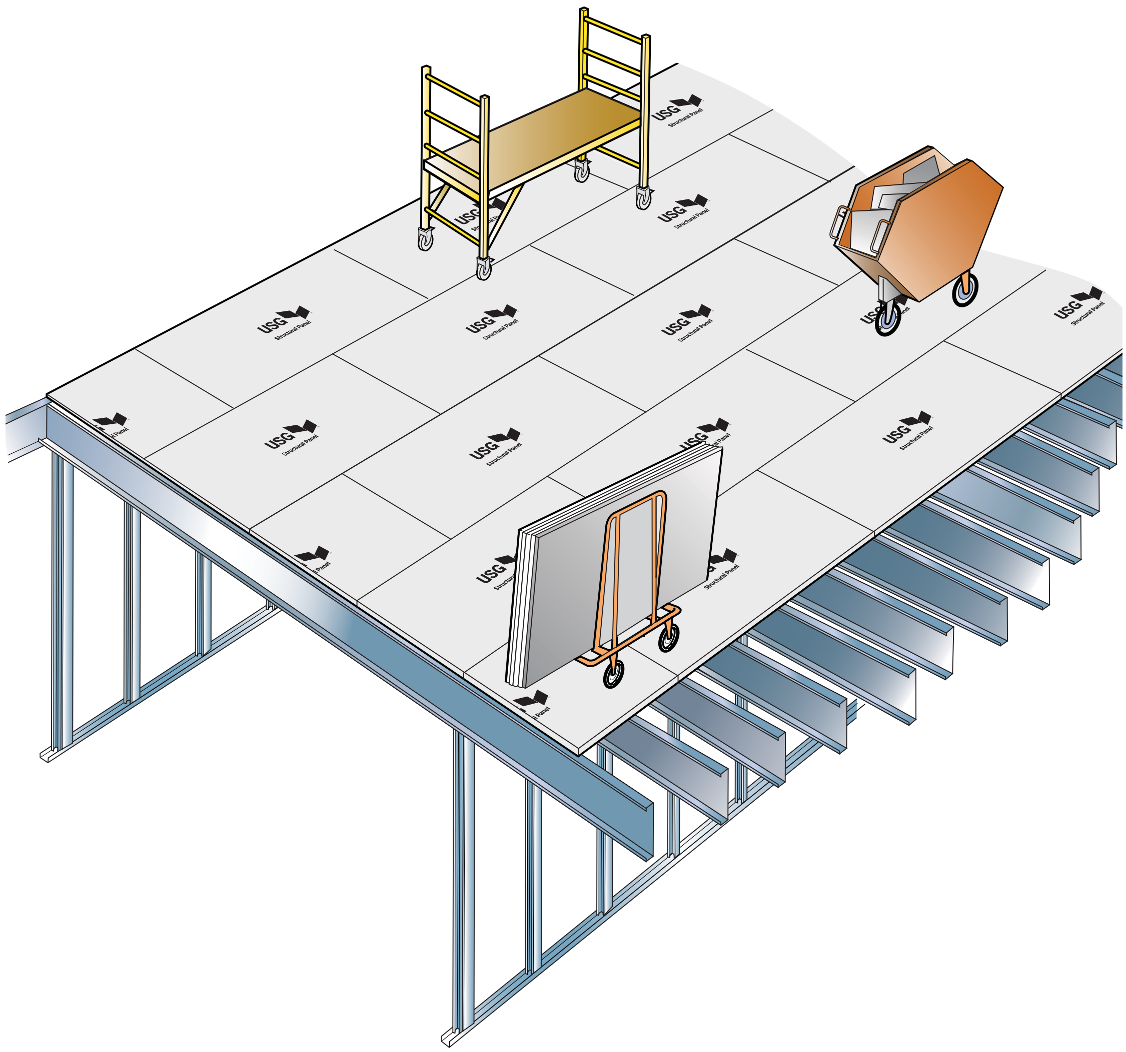
CORRECT

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL CUTTING

- Use a circular saw with a standard carbide tipped framing blade and a dust collection system.
- Wear appropriate respiratory protection
- Wear safety glasses
- Wear gloves
- Proper fall restraint equipment required
- Review the Safety Data Sheet (SDS) for use of proper Personal Protective Equipment (PPE).



USG STRUCTURAL PANEL CONCRETE SUBFLOOR EQUIPMENT LOADING

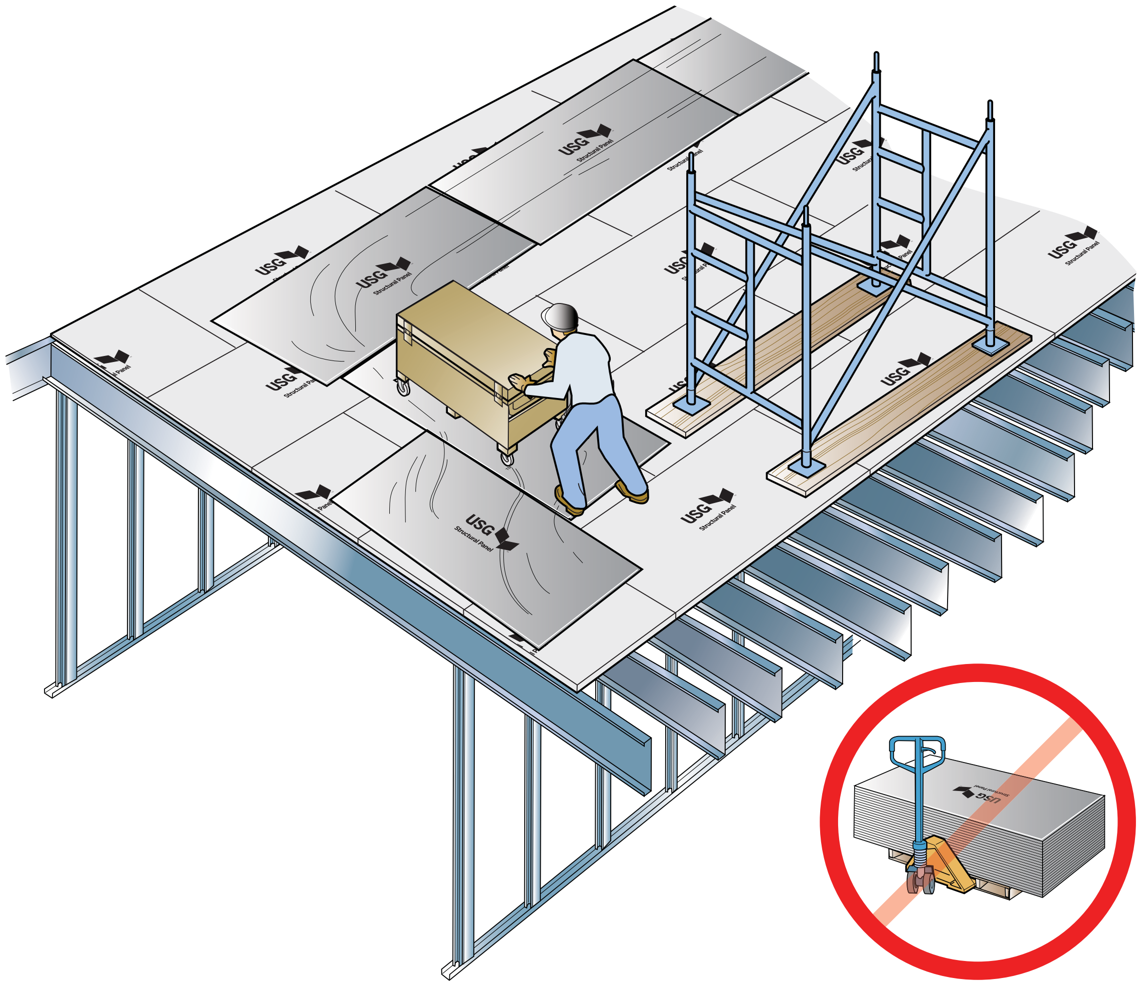


Typical Construction Equipment*	
Drywall Carts	10 Sheets of 5/8″ x 4′ x 12′ (16 mm x 1220 mm x 3660 mm) Gypsum Panels max. 1,200 lbs. (544 kg)
	7 Sheets of 3/4″ x 4′ x 8′ (19 mm x 1220 mm x 2440 mm) USG Structural Panels max. 1,200 lbs. (544 kg)
Rolling Trash Carts	1,000 lbs. max. (453 kg)
Rolling Scaffolds	750 lbs. max. (340 kg)

Note: Secure the cart. *Loads applicable to 24″ (610 mm) o.c. maximum framing spacing.

See Panel Protection—Page 14

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PANEL PROTECTION

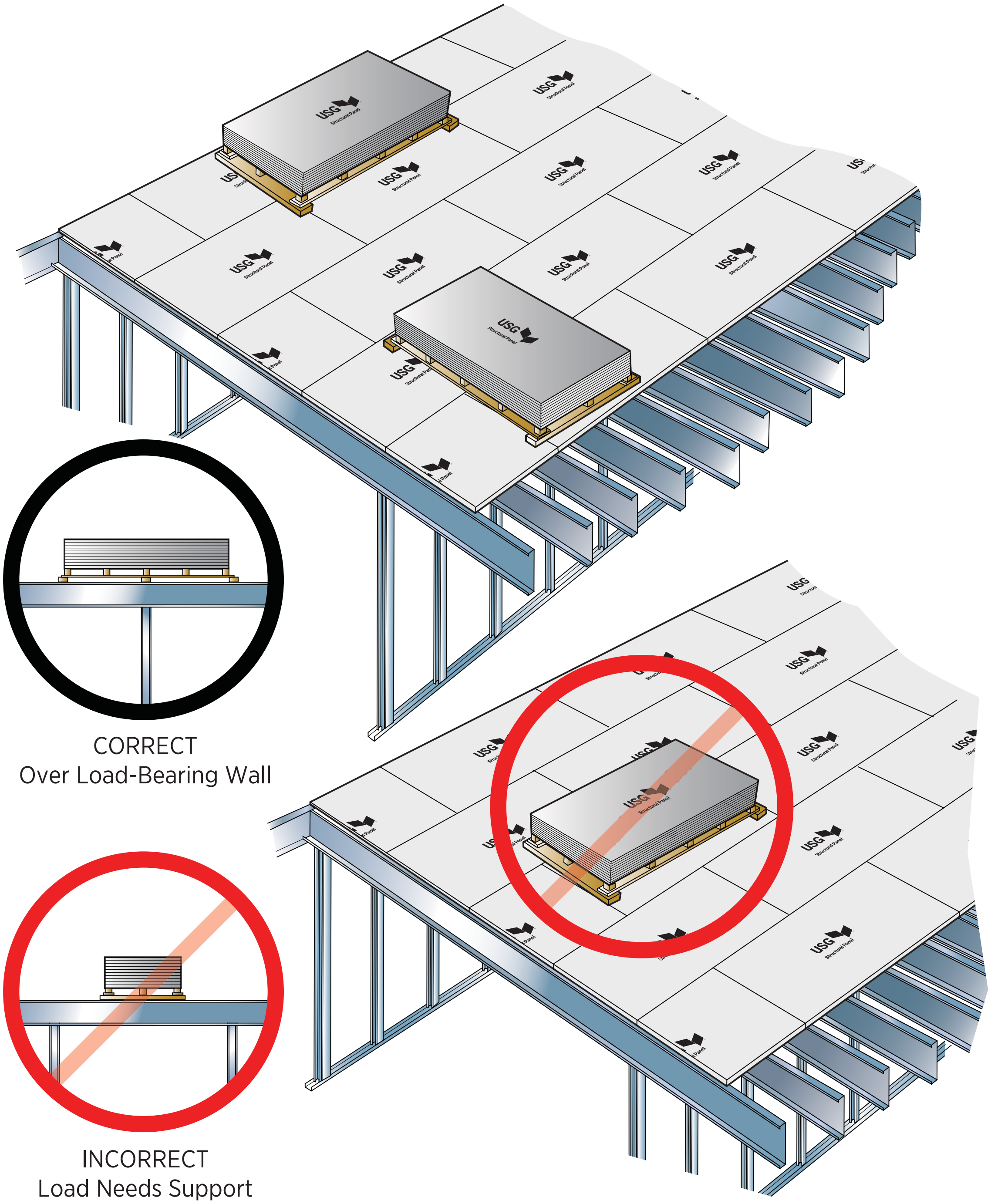


To protect installed panels during construction:

- Place load spreader planks perpendicular to joists for fixed scaffolding.
- Place additional USG Structural Panels or minimum 3/8″ plywood on the floor in high-traffic construction pathways for rolling gang boxes, two-wheel mason carts and trash boxes.
- Avoid rolling carts near protector panel edges.
- **Do not use a pallet jack on the floor.**
- Consult with designer of record for load limits and proper support for all construction loads.
- Proper fall restraint equipment required.

USG STRUCTURAL PANEL CONCRETE SUBFLOOR PALLET PLACEMENT*

Note: *Loading must be verified by a structural engineer

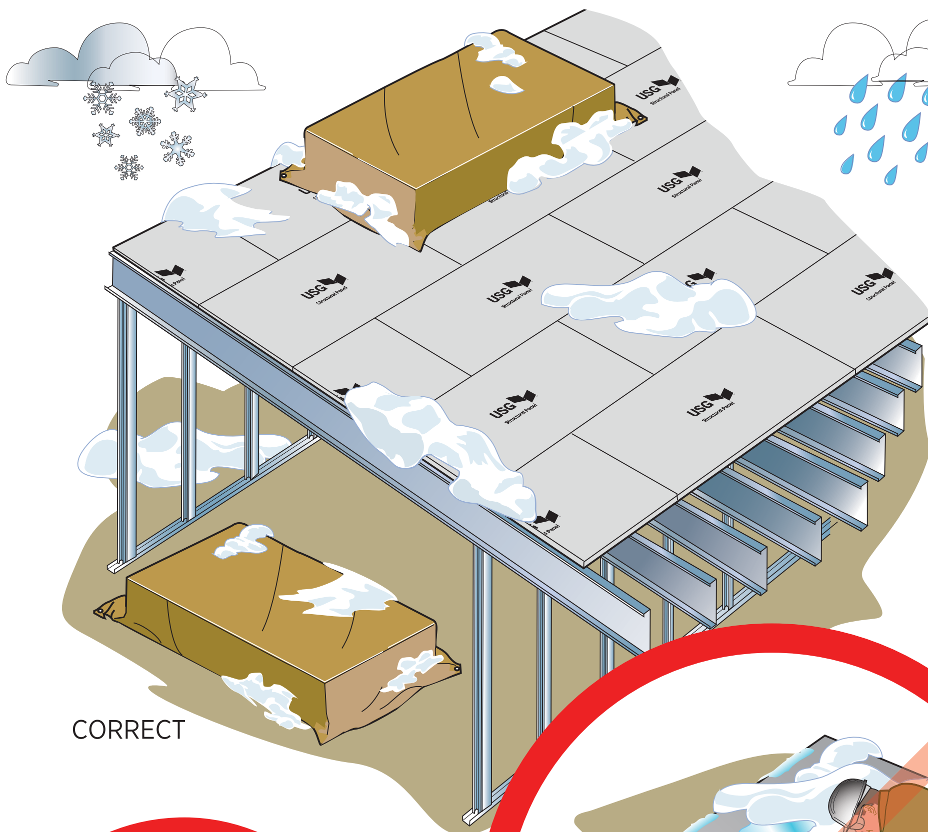


CORRECT
Over Load-Bearing Wall

INCORRECT
Load Needs Support

USG STRUCTURAL PANEL CONCRETE SUBFLOOR
PROPER PALLET STORAGE

- Ensure unit covers are secure
- Use plastic edge shovel for snow removal
- Freezing may result in panels sticking together
- Allow panels to thaw naturally if frozen
- **Only use sand when iced over. Do not use salt, fertilizer or ice melt.**



CORRECT

INCORRECT

INCORRECT

NOTES

PRODUCT INFORMATION

See usg.com for the most up-to-date product information.

CUSTOMER SERVICE

800 USG.4YOU (874-4968)

EMAIL

usgstructural@usg.com

WEBSITE

usg.com/structural

MANUFACTURED BY

United States Gypsum Company
550 West Adams Street
Chicago, IL 60661

MSRP based upon full truckload delivered to jobsite:
Subfloor: $4.50/sf

DANGER
Causes skin irritation. Causes serious eye damage. May cause an allergic skin reaction. May cause respiratory irritation. May cause cancer by inhalation of respirable crystalline silica. Do not handle until all safety precautions have been read and understood. Avoid breathing dust. Use only in a well-ventilated area and wear a NIOSH/MSHA approved respirator. Wear protective gloves/protective clothing/eye protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses and continue rinsing. Immediately call a poison center/doctor. If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. If skin irritation or rash occurs, or otherwise exposed or concerned: Get medical attention. Store locked up. Dispose of in accordance with local, state and federal regulations.
For more information call Product Safety: 800 507-8899 or see the SDS at usg.com.
KEEP OUT OF REACH OF CHILDREN.

NOTICE
We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by applications of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within 30 days from date it was or reasonably should have been discovered.

SAFETY FIRST!
Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

SCP14/rev. 4-19

USG
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CFS-NHERI 10-Story Test Portion

San Diego, California

1.00 PRODUCT IDENTIFICATION

1.01 The American Iron and Steel Institute standards are used in this package. Any manufacturer whose product geometries meets or exceed AISI standards and who is part of a code compliance program that includes third party physical audits is acceptable to comply with the design intent. Manufacturers who are currently approved in a compliance program can be found at www.archtest.com/certification.

362 S 162 33

Web Size — 362; Member Type — S; Flange Size — 162; Thickness(mils) — 33

1.02 The last two numbers indicate the steel thickness:

Gage	Design	Minimum	AISI	Color Coding
20	0.0346"	0.0329"	33 mils	White
18	0.0451"	0.0428"	43 mils	Yellow
16	0.0566"	0.0538"	54 mils	Green
14	0.0713"	0.0677"	68 mils	Orange
12	0.1017"	0.0966"	97 mils	Red

1.03 Basis of Design Material for this project by:

ClarkDietrich™ BUILDING SYSTEMS

9050 Centre Pointe Drive
Suite 400
West Chester, OH 45069
Phone: 513-870-1100
Fax: 513-870-1300
www.clarkdietrich.com

2.00 STUD FRAMING

2.01 All field cutting of studs must be done by sawing, shearing, or plasma cutting. Other torch cutting methods of cold-formed members are unacceptable.

2.02 No notching or coping of studs is allowed, unless detailed within this drawing package.

2.03 Splicing of wall studs is not allowed, unless otherwise detailed within this drawing package.

2.04 Framing fabricator is to ensure punch out alignment when assembling lateral bracing and field cutting studs to length. Lateral bracing must be installed at the time the wall is erected. Failure to install bracing at this time may compromise the structural integrity of the building.

2.05 Design assumes condition to be in final location and stabilized. Temporary bracing (by others) or other means of stabilization may be required until framing is in its stable and final condition.

2.06 Spandrel wall studs framing above a window, and having connections to the top and bottom of the same beam, or having a single connection to a beam, and a kicker to another structural element, may require slip connections at the head of the window. In such situations, the engineer of record shall verify that the window system is designed accordingly.

2.07 Use minimum of two studs at the corner of all walls addressed in this submittal unless noted otherwise in the contract documents or this drawing package.

2.08 Use minimum of three studs at the intersection of all load bearing walls (exterior/or interior) unless noted otherwise in the contract documents or this drawing package.

2.09 Joist or roof member must bear directly over stud. If not, a structural distribution member (designed accordingly) is required on top of runner track for proper bearing and anchorage.

2.10 Studs from floor above must bear directly over studs or joists. If not, a structural distribution member (designed accordingly) is required on top of joist for proper bearing.

2.11 All headers/built-up beams are to be constructed with UNPUNCHED material only.

2.12 Splicing of headers is not allowed, unless otherwise detailed within this drawing package.

2.13 If additional holes are required in the metal studs or joists, contact a licensed professional engineer for guidance before cutting holes.

2.14 Per the AISI Standard for Cold-Formed Framing - Wall Design, the maximum allowable gap (measured between the web of the stud and the web of the track) for a stud seated in a track is 1/4" for non-axial load bearing conditions and 1/8" for axial load bearing conditions (U.N.O.). Pressure should be applied to nest the studs into the tracks until the tolerances listed above are achieved. Failure to do so could result in serviceability problems in the future.

3.00 JOIST AND RAFTER

3.01 Platform framed joist or rafter member must bear directly over stud. If not, a structural distribution member (designed accordingly) is required on top of runner track for proper bearing and anchorage.

3.02 Ledger framed joist or rafter member may be installed "in-line" with on-center studs or "off-module" to on-center studs. For off-module, the joist rim-track or rim-channel will be deisgned and used as a structural distribution member.

3.03 All splice requirements for joists and rafters must be determined through engineering analysis.

3.04 All field holes must be pre-approved by ClarkDietrich Engineering. No notching or coping of joists or rafters is allowed unless detailed in this shop drawing package.

3.05 Joist or rafter bridging must be installed at the time the floor or roof is erected. Failure to install bracing at this time may compromise the structural integrity of the building. Temporary construction bracing is by others.

4.00 SUBMITTAL

4.01 This drawing package is being submitted for approval only. Any materials ordered or constructed based on this drawing package prior to final approval from the Architect and Engineer of Record is at the risk of the Framing Contractor. Framing Contractor is advised to obtain final approved drawing package prior to ordering material and/or construction. ClarkDietrich Engineering Design Inc. (CDED)is not responsible for Framing Contractor proceeding without a final approved drawing package.

4.02 Drawings submitted without an engineers signature and seal are preliminary and for review only. Preliminary drawings should not be submitted for approval. It is intended that the preliminary drawing be reviewed by the Framing Contractor and returned with comments prior to finalizing a signed and sealed approval drawing package for approval. If an unsigned and sealed drawing package is mistakenly submitted for approval, please notify CDED.

4.03 For all conditions listed herein and/or required for this project, it is the General Contractor's, Architect's, and Engineer of Record's responsibility to mark drawings according to actual design requirements, coordination with other Work, and differing field conditions that exist at time of initial creation of this drawings package.

4.04 The contents of this shop drawing submittal show the intended application of cold formed components and the connections of these components to each other and to the primary structure. The construction methodology chosen, field framed or shop fabricated, is a decision that is made by others and not by CDED. If the option for shop fabrication or panelization should be chosen as the construction methodology, any and all drawings related to fabrication of such panels should be considered as a separate submittal from this shop drawing package.

5.00 CONNECTIONS

5.01 All screw connections are based on NASPEC section E4, which outlines the AISI specification provisions for screw connections.

5.02 For screws, a minimum of 3.0 x Screw Diameter clearance must be maintained from all edges of steel members when the edge is perpendicular to the direction of the applied force and 1.5 x Screw Diameter when the edge is parallel to the direction of the applied force. A minimum of 3.0 x Screw Diameter on-center spacing must be maintained between adjacent screws.

5.03 If required, all welded connections are to be performed in accordance with the latest version of AWS D1.3 specifications for Welding Sheet Steel in Structures. Consult AWS D19.0 Welding Zinc Coated Steel and ANSI standard Z49.1 for information regarding safe welding procedures.

5.04 Suggested weld metal and process for shop welding are 60 ksi weld metal strength (min., u.n.o.). Suggested methods for field welding are 1/8" (u.n.o.) E60xx (min., u.n.o.) electrode-SMAW, or "gasless" MIG. Minimum weld throat thickness (t) must match or exceed the base steel thickness of the thinnest connected part unless noted otherwise.

5.05 In welding, the zinc coating on steel framing will be burned away; therefore, a zinc rich paint must be applied to the weld area to provide corrosion resistance.

5.06 Any substitution of fasteners with equivalent properties (head/shank diameter, load carrying capacities, edge distances, fastener spacing, etc.) must be submitted to CDED for review and approval prior to installation.

5.07 It is the responsibility of others to verify that fasteners are installed according to manufacturer's instructions. It is also the responsibility of others to verify and ensure the quality of fastener connections.

5.08 Drift connection necessity to allow for primary structure movement is the responsibility of the Engineer of Record. If the contract documents do not indicate this requirement, this drawing package will not include drift connections.

5.09 All powder actuated fasteners (PAF) shall be those as manufactured and tested by HILTI or equal. The following minimum edge distances and fastener spacings apply:

Pin Diameter	Min. Edge Distance		Min. Spacing		Penetration		ICC Report Number
	Steel	Concrete	Steel	Concrete	Steel	Concrete	
0.157"Ø	1/2"	3"	1"	4"	Full	Varies	ESR-2269

Specify the following fastener types when ordering:

PAF Diameter	Attachment to Structural Steel	Attachment to Concrete
0.157"Ø	X-U	X-U

6.00 GENERAL

6.01 Design performed in accordance with the AISI S100-16 "Specification for the Design of Cold Formed Steel Structural Members".

6.02 The latest edition of the American Iron and Steel Institute "Code of Standard Practice for Cold-Formed Steel Structural Framing" shall be used as the reference of standard practices.

6.03 Dimensions shown in this shop drawing package are for design reference only. Contract Drawings should be used in determining exact distances and all conditions should be field verified before erection. Plan view layout and/or Elevation in this drawing package are for general conformance only. Framing Contractor is directed to the Contract Drawings for specific section callouts, façade requirements, and any other details not shown herein. ClarkDietrich Engineering Design Inc. (CDED) is not responsible for additional requirements or similar section references that conflict with the Contract Drawings.

6.04 CDED does not assume any responsibility for the adequacy of the primary structure and foundation design.

6.05 Contents of this drawing package show the intended application of cold-formed components. Framing Contractor is to refer to the project contract documents for additional construction assembly requirements.

6.06 All connections shall be complete as per the plans and specifications at the time of installation. Failure to promptly complete connections may compromise the structural integrity of the building.

6.07 Removed.

6.08 Precautions must be taken to avoid construction loads exceeding design live loads. Construction loads have not been considered in these recommendations.

6.09 Unless noted otherwise in this drawing package, CDED interprets all concrete and roof edge angles to be structural with a minimum thickness of 0.25". Fastener and connection performance is based on this interpretation.

6.10 CDED interprets all concrete to be at least 3000 psi, unless noted otherwise in this drawing package or in the accompanying calculation set.

6.11 CDED interprets specifications that have a requirement for a specialty engineer to provide shop drawings that include signed and sealed calculations and drawings by a Professional Engineer, to mean that the Architect and EOR are giving CDED design responsibility for the cold-formed metal framing. Should the Architect and/or EOR mark-up CDED's design in a manner that is not consistent with given design limitations, standards, and/or CDED's recommendations, then CDED is released from design responsibility and liability for this project.

6.12 Framing design assumes all cladding is uniformly laterally attached to each framing member and is limited to a uniform distribution of load to the framing member. The design does not include review of the effects of local forces resulting from the attachment of any cladding (brick ties, attachment clips, etc.).

6.13 All window and door units are assumed to apply load to the surrounding metal framing uniformly unless information is provided that details a different load application.

6.14 Conflicting or missing information on the Contract Drawings will be noted in this drawing package for clarification during the review and approval process. Any information that is not noted herein as conflicting or missing does not relieve all reviewing parties from providing such information. CDED is not responsible to note all conflicting or missing information and does not purport to have included all conditions that are in conflict or missing in this drawing package. The Framing Contractor is advised to completely review the Contract Drawings and compare to this drawing package for conflicting and/or missing information prior to ordering material and/or construction.

6.15 For specific requirements and warranty information on systems or materials connected and appurtenant to the cold-formed framing including but not limited to windows, caulking and flashing, refer to manufacturer's data. The integrity of the building envelope, including but not limited to siding, flashing, fasteners, etc, to prevent water penetration and or damage, is not the responsibility of CDED. CDED assumes no responsibility for the proper construction and/or function of the total architectural assembly.

6.16 Calculations and shop drawings included in this technical recommendation set specifies the required shearwalls, diaphragm, and all relevant connections to provide the overall lateral stability of the structure above the foundation or podium.

DESIGN CRITERIA

ARCH./E.O.R. PLEASE VERIFY ALL DESIGN CRITERIA.

Location:	Irvine, CA
Design Based on:	IBC 2018, CBC 2016
Building Risk Category:	II

Wind Load: Components and Cladding

Basic Wind Speed (V) =	115 mph
Importance Factor (I_w) =	1.0
Exposure =	C
Mean Roof Height (h) =	100'-0"
Least Building Width (W_b) =	48'-0"
Corner Zone Distance (a) =	5'-0"

Dead Loads

Interior LB Wall Dead Load =	12 psf
Exterior LB Wall Dead Load (EIFS) =	15 psf
Roof Dead Load =	24 psf
Unit Floor Dead Load =	21 psf
Corridor Dead Load =	21 psf
Public Dead Load =	21 psf

Live Loads

Roof Live Load =	20 psf
Unit Floor Live Load =	50 psf *
** 10 psf partition load in unit areas*	
Corridor Live Load =	40 psf
Public Live Load =	100 psf

Seismic Criteria

Seismic Design Category =	D
Importance Factor (I_e) =	1.00
Component Importance Factor (I_p) =	1.00
Site Class =	C
S_{DS} =	1.009g
S_{D1} =	0.452g
R =	6.5 †

† Light-Framed (CFS) walls sheathed with steel sheets

Deflection Criteria:

Roof Joist Live Load =	L/360
Roof Joist Total Load =	L/240
Floor Joist Live Load =	L/480
Floor Joist Total Load =	L/240
Interior Wall =	L/240
Exterior Wall (EIFS) =	L/360

This Drawing Package is based on Contract Drawing Set:

SEAOC SSDM Vol. 2 Example 3

100% – FOR CONSTRUCTION

SHEET INDEX

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ClarkDietrich. ENGINEERING DESIGN INC.

CFS-NHERI 10-Story Test Portion

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Revisions

1 For Construction 3/23/22

Drawn:	Engineer:	Reviewed:

Date: 10/29/2021

Project Number: 2150200882-1

Sheet Title: GENERAL NOTES

Sheet No. LSF-1.0

WALL TYPE	WALL STUD SCHEDULE																			
	LEVEL 1		LEVEL 2		LEVEL 3		LEVEL 4		LEVEL 5		LEVEL 6		LEVEL 7		LEVEL 8		LEVEL 9		LEVEL 10	
	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE	DESCRIPTION	PROFILE
W1 EXTERIOR JB (6", 24" OC)	600S350-97 (50KSI)	MP1.1	600S300-97 (50KSI)	MP1.1	600S300-97 (50KSI)	MP1.1	600S200-97 (50KSI)	MP1.1	600S200-97 (50KSI)	MP1.1	600S300-68 (50KSI)	MP1.1	600S200-68 (50KSI)	MP1.1	600S300-54 (50KSI)	MP1.1	600S200-54 (50KSI)	MP1.1	600S162-68 (50KSI)	MP1.1
W3 INTERIOR DEMISING NJB (6", 24" OC)	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-54 (50KSI)	MP1.1	600S162-43 (33KSI)	MP1.1	600S162-43 (33KSI)	MP1.1	600S162-43 (33KSI)	MP1.1
W5 INTERIOR CORRIDOR JB (6", 24" OC)	600S350-97 (50KSI)	MP1.1	600S300-97 (50KSI)	MP1.1	600S250-97 (50KSI)	MP1.1	600S350-68 (50KSI)	MP1.1	600S350-68 (50KSI)	MP1.1	600S250-68 (50KSI)	MP1.1	600S350-54 (50KSI)	MP1.1	600S200-54 (50KSI)	MP1.1	600S200-43 (33KSI)	MP1.1	600S162-43 (33KSI)	MP1.1

NOTES: *NOTES BELOW APPLY TO ALL WALLS AT ALL LEVELS.

1. WALL STUDS TO BE SPACED AT 24" ON-CENTER.
2. WALL TRACK TO BE 1 $\frac{1}{4}$" LEG MINIMUM, WITH DEPTH & MATERIAL TO MATCH THE ON-CENTER STUD UNO ON PLAN AND DETAILS. EXCEPT WALL TRACK FOR WALL TYPE W2 TO BE 600T250-97 (50KSI).
3. ALL WALL TRACK SHALL SEATED WELL AND FASTENED TO STUDS, JAMBS & POSTS PER SCHEDULES AND DETAIL 3/LSF-6.0 EXCEPT WHERE OTHERWISE NOTED IN DETAILS.
4. BOTTOM WALL TRACK TO BE FASTENED TO 1st FLOOR CONCRETE PER DETAIL 10/LSF-6.0 EXCEPT WHERE OTHERWISE NOTED IN DETAILS.
5. BRACE STUDS LATERALLY PER WALL SECTIONS AND DETAIL 1/LSF-6.0 AT 3ft & 7ft PUNCHOUTS.
6. WALL TRACK SHALL BE CONTINUOUS ALONG THE ENTIRE WALL LENGTH. WHERE A SPLICE IS REQUIRED, SEE DETAIL 11/LSF-6.0.
7. LONG WALL PANEL LENGTHS (>10ft) REQUIRE STRONGBACK BRACING OR ROTATED ON-CENTER STUDS. SEE PLAN NOTE 1 FOR APPROXIMATE STRONGBACK LOCATIONS AND DETAIL 12/LSF-6.0 FOR CONFIGURATION AND STRONGBACK MEMBER. WHERE A COLUMN IS AT THE END OF A WALL PANEL, FASTEN THE BRIDGING PER 1A/LSF-6.0. ROTATED ON-CENTER STUDS CAN BE USED IN-LIEU OF STRONGBACKS, SEE DETAIL13/LSF-6.0.
8. SEE DETAIL 14/LSF-6.0 FOR TYPICAL EXTERIOR SHEATHING FASTENER PATTERN. GYPSUM SHEATHING IS NOT A NAILING SURFACE. CLADDING SYSTEM SHALL BE FASTENED THROUGH THE SHEATHING AND TO THE WALL STUD FRAMING (BY OTHERS, MIN 3-SCREW THREADS THRU LSF).

WALL OPENING JAMB SCHEDULE *											
(1) HEADER TYPE (ELEVATION)	(2) APPROX. WIDTH HEIGHT	(3) WALL OPENING JAMB PER LEVEL (MPx.x MEMBER PROFILE UNO)									
		LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	LEVEL 9	LEVEL 10
H-1 (1/LSF-4.0) 1st - 10th	3'-4" 7'-2"	600HDS300-97 (50 KSI) (MP1.6)	600HDS300-97 (50 KSI) (MP1.6)	600S350-97 (50 KSI) (MP1.1)	600S350-97 (50 KSI) (MP1.1)	600S250-97 (50 KSI) (MP1.1)	600S350-68 (50 KSI) (MP1.1)	600S300-68 (50 KSI) (MP1.1)	600S350-54 (50 KSI) (MP1.1)	600S162-54 (50 KSI) (MP1.1)	600S162-43 (33 KSI) (MP1.1)
H-4 (4/LSF-4.0) 1st - 10th	4'-8" 4'-0"	600HDS300-97 (50 KSI) & 600S162-54 (50 KSI) (MP1.7)	600HDS300-97 (50 KSI) & 600S162-54 (50 KSI) (MP1.7)	600HDS300-97 (50 KSI) (MP1.6)	600HDS300-97 (50 KSI) (MP1.6)	600S350-97 (50 KSI) (MP1.1)	600S300-97 (50 KSI) (MP1.1)	600S250-97 (50 KSI) (MP1.1)	600S350-68 (50 KSI) (MP1.1)	600S200-68 (50 KSI) (MP1.1)	600S250-68 (50 KSI) (MP1.1)

NOTES: *NOTES 1 THROUGH 8 BELOW APPLY TO ALL OPENINGS AT ALL LEVELS.

1. JAMBS MUST BE CONTINUOUS FROM TOP OF WALL TO FLOOR SLAB. JAMBS MUST ALIGN FROM LEVEL-TO-LEVEL.
2. SEE WALL OPENING ELEVATIONS FOR CRIPPLE STUDS. ALL DIMENSIONS ARE FOR STRUCTURAL REFERENCE ONLY AND SHALL BE VERIFIED WITH CONTRACT DRAWINGS FOR ACTUAL ROUGH OPENINGS.
4. REFER TO ARCHITECTURAL DRAWINGS FOR ACTUAL ROUGH OPENING SIZE REQUIREMENTS. DIMENSIONS SHOWN ARE FOR STRUCTURAL REFERENCE ONLY.
5. ALL HEADER, HEAD, SILL, AND JAMB MEMBERS MUST BE FULL LENGTH. NO SPLICES ARE PERMITTED. SEE WALL OPENING ELEVATIONS.
6. WALL TOP TRACKS MUST BE CONTINUOUS OVER OPENINGS. NO SPLICES ARE PERMITTED. SIZE AND MATERIAL PER WALL SCHEDULE.
7. CONNECT LATERAL BRACING TO JAMBS AT SPACING MATCHING WALL O.C. STUDS PER DETAIL 1/LSF-6.0. JAMBS MAY BE CONTRIBUTING TO OC STUD BRACING.
8. BOX HEAD, BOX HEADERS, AND BACK-TO-BACK HEADERS MUST BE UNPUNCHED MATERIAL. END-JOIST HEADERS MAY BE PUNCHED, EXCEPT NO PUNCH-OUTS WITHIN 9" OF EACH END CONNECTION.
9. FASTEN SHEATHING TO POSTS AND JAMBS SIMILAR TO THE OC WALL STUDS. SEE DETAIL 14/LSF-6.0.

JOIST TYPE	C-SHAPE JOIST SCHEDULE							GOVERNING LOCATION
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	JOIST DESCRIPTION	PROFILE	RIM-TRACK / TAB (MP1.5)	RIM-CHANNEL / ANGLE (MP1.4)	IN-LINE CONN. TO STUD	OFF-MODULE CONN. TO STUD	JOIST CONN. @ TAB OR CLIP	
J1 (16" O.C.)	1200S250-68 (50 KSI)	MP1.3	1200TD125/250-68 (50 KSI) WITH CONN. TAB @ 16" OC	1200T150-68 (50 KSI) WITH (1) S547 ANGLE CLIP @ 16" OC	RIM-TRACK OR CLIP THROUGH RIM-CHANNEL (6) #12 SCREWS TO -43 STUD (3) #12 TO -54 & HEAVIER STUD	RIM TO STUD CONNECTION (7) #12 SCREWS TO -43 STUD (4) #12 TO -54 & HEAVIER STUD	(3) #12 SCREWS TO JOIST	UNIT FLOOR UP TO 21'-6" SPANS
J4 (16" O.C.)	1200S250-54 (50 KSI)	MP1.3	1200TD125/250-54 (50 KSI) WITH CONN. TAB @ 16" OC	1200T150-54 (50 KSI) WITH (1) S547 ANGLE CLIP @ 16" OC	RIM-TRACK OR CLIP THROUGH RIM-CHANNEL (4) #12 SCREWS TO -43 STUD (2) #12 TO -54 & HEAVIER STUD	RIM TO STUD CONNECTION (4) #12 SCREWS TO -43 STUD (2) #12 TO -54 & HEAVIER STUD	(2) #12 SCREWS TO JOIST	UNIT ROOF UP TO 21'-6" SPANS

NOTES:

1. JOISTS SPACING VARIES (12", 16" OR 24" ON-CENTER) AND IS LISTED IN THIS SCHEDULE WITH THE JOIST TYPE, UNLESS OTHERWISE INDICATED ON PLAN.
2. JOIST CONNECTIONS TO -43 MIL STUDS LOADBEARING WALLS WILL REQUIRE MORE SCREWS THAN CONNECTIONS TO -54 MIL OR GREATER STUDS. AT ROOF JOIST TO PARAPET STUD CONNECTIONS, SEE WALL SECTION FOR MINIMUM SCREWS.
3. JOIST AND RIM SHALL BE MANUFACTURED BY CLARKDIETRICH BUILDING SYSTEMS.
4. EACH JOIST MAY ALIGN DIRECTLY WITH A WALL STUD (IN-LINE FRAMING) OR IN-BETWEEN OC STUDS (OFF-MODULE) AS LONG AS APPROPRIATE CONNECTIONS ARE USED.
5. JOIST FLOOR AND ROOF DECK IS 3/4" USG STRUCTURAL CEMENT PANEL (TONGUE & GROOVE) ON 16GA MINIMUM FRAMING. SEE DETAILS 5/LSF-6.0 & 6/LSF-6.0.
6. JOIST MATERIAL MUST BE UNPUNCHED WITHIN 6" FROM CUT ENDS AND BEARING LOCATIONS.
7. END-JOIST MATERIAL MAY BE UNPUNCHED OR STANDARD C-SHAPE MEMBERS TO AVOID TRADEREADY PUNCHOUTS OCCURRING AT ON-CENTER STUDS, JAMBS AND LADDER BLOCKING.
8. JOIST BLOCKING AT 8'-0" ON-CENTER MAXIMUM SPACING. SEE DETAIL 7/LSF-6.0. LADDER BLOCKING IS REQUIRED AT EXTERIOR NON-JOIST BEARING WALLS. SEE WALL SECTIONS AND DETAIL 8/LSF-6.0.

MEMBER PROFILES									
PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION
MP1.1	STUD	MP1.2	WALL TRACK	MP1.3	C-SHAPE JOIST	MP1.4	RIM-CHANNEL	MP1.5	TRADEREADY RIM-TRACK
MP1.6	HEAVY DUTY STUD	MP1.7	STUD (2) #10 SCREWS @ 16" O.C. HEAVY DUTY STUD t 1" - 16" ALT.	MP1.8	HEAVY DUTY STUD t 1" - 16" t 1" - 16"				
								MPC.1	HSS

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CFS-NHERI 10-Story Test Portion

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Revisions

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1 For Construction	3/23/22

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Project Number: 2150200882-1

Sheet Title: MATERIAL SCHEDULES

Sheet No. LSF-1.1

SHEAR WALL SCHEDULE *

SHEARWALL TYPE (DETAILS)	(1) LEVEL	(2) SHEAR WALL MINIMUM ON-CENTER STUD & TRACK MATERIAL	END POSTS (3) END POSTS MEMBER	END POSTS (4) PROFILE	HOLDOWNS AT BOTTOM OF WALL (TOP OF LEVEL BELOW) (5) TYPE	HOLDOWNS (6) DETAIL (BOTTOM OF WALL)	HOLDOWNS (7) THREADED ROD ANCHOR	SHEATHING (8) TYPE	SHEATHING (9) FASTENER PATTERN	BOTTOM CONNECTION (10) WALL BOTTOM TO TOP TRACK FASTENERS
SW-1 INTERIOR WALL AT W3 GRIDLINE D	10	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	6 / 12	#12 SCREW AT 24" ON-CENTER
	9	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	6 / 12	#12 SCREW AT 12" ON-CENTER
	8	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	4 / 12	#12 SCREW AT 9" ON-CENTER
	7	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	6 / 12	#12 SCREW AT 12" ON-CENTER
	6	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 12" ON-CENTER
	5	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 9" ON-CENTER
	4	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	3 / 12	#12 SCREW AT 9" ON-CENTER
	3	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	3 / 12	#12 SCREW AT 9" ON-CENTER
	2	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	#12 SCREW AT 6" ON-CENTER
	1	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	3/8" DIA x 1" Gr5 HEX HEAD CAP SCREW AT 9" OC TO BASEPLATE
SW-2 EXTERIOR W1 & CORRIDOR W5 WALL GRIDLINES 1 & 2	10	43-MIL (33 KSI) MIN	(1) 600S250-43 (33 KSI)	MP1.1	USP S/PHD4 (8) #14 SCREWS	5/LSF-5.0	5/8"Ø F1554 Gr36, (2) HVY HN's & FW's	27 MIL STEEL SHEET (33Ksi)	6 / 12	#12 SCREW AT 24" ON-CENTER
	9	43-MIL (33 KSI) MIN	(1) 600HDS300-54 (50 KSI)	MP1.6	CD8 (17) #14 SCREWS	5/LSF-5.0	7/8"Ø F1554 Gr36, (2) HVY HN's & FW's	27 MIL STEEL SHEET (33Ksi)	4 / 12	#12 SCREW AT 9" ON-CENTER
	8	43-MIL (33 KSI) MIN	(1) 600HDS300-97 (50 KSI)	MP1.6	CD10 (23) #14 SCREWS	5/LSF-5.0	7/8"Ø F1554 Gr36, (2) HVY HN's & FW's	27 MIL STEEL SHEET (33Ksi)	2 / 12	#12 SCREW AT 12" ON-CENTER
	7	54-MIL (50 KSI) MIN	(2) 600HDS300-68 (50 KSI)	MP1.8	(2) CD15 (30) #14 SCREWS	6/LSF-5.0	1"Ø F1554 Gr36, (2) HVY HN's & FW's	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 9" ON-CENTER
	6	54-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{3}{16}$ (A500 GR.B)	MPC.1	$\frac{1}{4}$" x 5"w A36 PLATE, tw=$\frac{3}{16}$ Lw=4"	7/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	3 / 12	#12 SCREW AT 9" ON-CENTER
	5	54-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{3}{16}$ (A500 GR.B)	MPC.1	$\frac{3}{8}$" x 5"w A36 PLATE, tw=$\frac{1}{4}$" Lw=4"	7/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	#12 SCREW AT 6" ON-CENTER
	4	68-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{1}{4}$ (A500 GR.B)	MPC.1	$\frac{1}{2}$" x 5"w A36 PLATE, tw=$\frac{5}{16}$ Lw=4"	7/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	#12 SCREW AT 6" ON-CENTER
	3	68-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{5}{16}$ (A500 GR.B)	MPC.1	$\frac{1}{2}$" x 5"w A572 Gr50 PL, tw=$\frac{3}{8}$ Lw=5"	7/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	#12 SCREW AT 6" ON-CENTER
	2	68-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{3}{8}$ (A500 GR.B)	MPC.1	$\frac{1}{2}$" x 5"w A572 Gr50 PL, tw=$\frac{3}{8}$ Lw=5"	7/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	#12 SCREW AT 6" ON-CENTER
	1	97-MIL (50 KSI) MIN	HSS 6 x 6 x $\frac{3}{8}$ (A500 GR.B)	MPC.1	(4) $\frac{5}{16}$" x 5"w Weld HSS @ Transfer PL	8/LSF-5.0	- -	33 MIL STEEL SHEET (33Ksi BLOCKED)	2 / 12	3/8" DIA x 1" Gr5 HEX HEAD CAP SCREW AT 6" OC TO BASEPLATE
SW-3 INTERIOR WALL AT W3 GRIDLINES C & E	10	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	6 / 12	#12 SCREW AT 24" ON-CENTER
	9	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	6 / 12	#12 SCREW AT 16" ON-CENTER
	8	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	4 / 12	#12 SCREW AT 9" ON-CENTER
	7	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	4 / 12	#12 SCREW AT 9" ON-CENTER
	6	43-MIL (33 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	27 MIL STEEL SHEET (33Ksi)	2 / 12	#12 SCREW AT 12" ON-CENTER
	5	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	6 / 12	#12 SCREW AT 12" ON-CENTER
	4	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 12" ON-CENTER
	3	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 9" ON-CENTER
	2	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	#12 SCREW AT 9" ON-CENTER
	1	54-MIL (50 KSI) MIN	SEE TENSION ROD SYSTEM BY OTHERS	- -	- -	- -	TENSION ROD BY OTHERS	33 MIL STEEL SHEET (33Ksi BLOCKED)	4 / 12	3/8" DIA x 1" Gr5 HEX HEAD CAP SCREW AT 9" OC TO BASEPLATE

NOTES:

1. BRACE ALL STUDS LATERALLY PER DETAIL 1/LSF-6.0 AT SPACING INDICATED IN WALL SCHEDULE.
2. -27 STEEL SHEETS TO BE ATTACHED WITH #8 SCREWS AND -33 STEEL SHEET TO BE ATTACHED WITH #10 SCREWS. USE A WAFER HEAD OR OTHER LOW PROFILE.
3. ALL HOLDOWN DEVICES INDICATED IN COLUMN (5) SHALL BE THOSE SUPPLIED BY CLARKDIETRICH CLIP EXPRESS. FLAT PLATE IS A36 BAR STOCK BY OTHERS.
4. FASTENER PATTERN REPRESENTS THE PERIMETER FASTENER SPACING / FIELD FASTENER SPACING IN INCHES.
5. 27 MIL AND 33 MIL STEEL SHEETS TO BE ASTM A1003 STRUCTURAL GRADE 33 (ST33H) MINIMUM BUT NOT GREATER THAN GRADE 50 (ST50H).
6. HOLDOWN EMBEDMENT PLATES / ANCHORS INSTALLED AT THE TOP OF SHAKE TABLE SHALL BE ATTACHED TO A REMOVABLE STRUCTURAL STEEL BASEPLATE COMPONENT. THE HSS ENDPOST MAY BE WELDED DIRECTLY TO THE BASEPLATE WITHOUT HOLDOWN PLATES. STEEL BASEPLATE IS DESIGNED BY OTHERS.
7. ALL-THREAD ROD ANCHORS SHALL HAVE (1) A194 GR.2H HEX NUT AND (1) F436 FLAT WASHER EACH END. HEX NUTS TO BE INSTALLED TO A SNUG TIGHT CONDITION.
8. SHEARWALL LOCATIONS AND LENGTHS ARE SHOWN ON PLAN. NOTE THAT HOLDOWNS ABOVE AND BELOW EACH FLOOR MUST ALIGN. FOR END OF SHEARWALLS AT OPENINGS, FURRING TRACK MAY BE NEEDED TO CREATE THE CORRECT ROUGH OPENING.
9. SHEARWALL MINIMUM ON-CENTER STUD MATERIAL IN COLUMN (2) ARE FOR SHEATHING CAPACITY. USE THE WALL SCHEDULE MATERIAL IF HEAVIER.
10. SW-1 AND SW-3 TENSION ROD SYSTEM SHALL BE DESIGNED AND DETAILED BY OTHERS.

MEMBER PROFILES

PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION	PROFILE	CONFIGURATION
MP1.1	STUD	MP1.2	WALL TRACK	MP1.3	C-SHAPE JOIST	MP1.4	RIM-CHANNEL	MP1.5	TRADEREADY RIM-TRACK
MP1.6	HEAVY DUTY STUD	MP1.7	STUD; (2) #10 SCREWS @ 16" O.C.; HEAVY DUTY STUD; t; 1" - 16"; ALT.	MP1.8	HEAVY DUTY STUD; t; t; 1" - 16"; 1" - 16"	MPG.1	(2) #12 SCREWS @ 16" O.C.; JOIST BACK-TO-BACK		
								MPC.1	HSS

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CFS-NHERI 10-Story Test Portion

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Revisions

1	For Construction	3/23/22

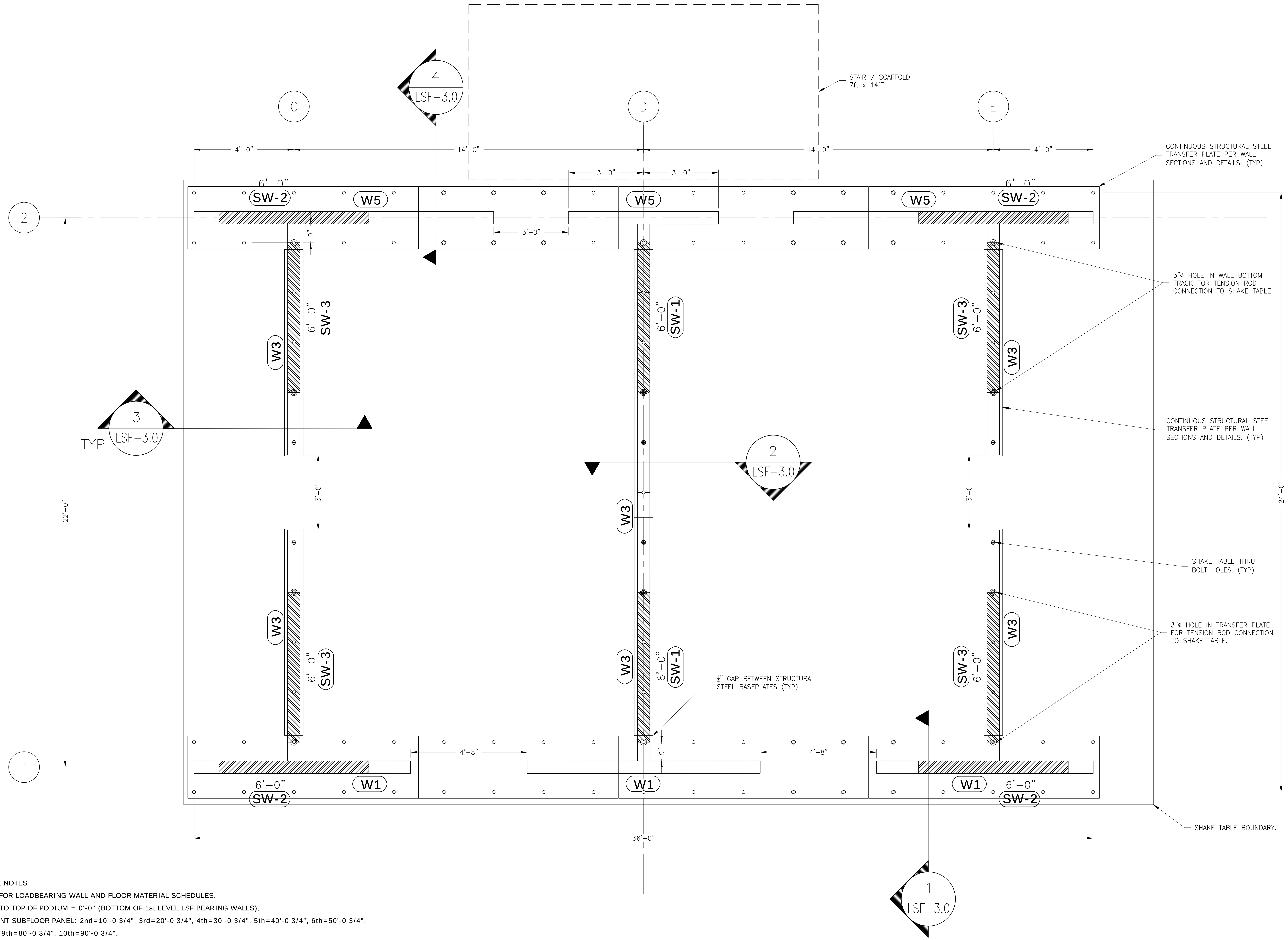
Drawn: | Engineer: | Reviewed:

Date: 10/29/2021

Project Number: 2150200882-1

Sheet Title: MATERIAL SCHEDULES

Sheet No. LSF-1.2



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2. REFER TO LSF-1.1 AND LSF-1.2 FOR LOADBEARING WALL AND FLOOR MATERIAL SCHEDULES.
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4. TOP OF 3/4" STRUCTURAL CEMENT SUBFLOOR PANEL: 2nd=10'-0 3/4", 3rd=20'-0 3/4", 4th=30'-0 3/4", 5th=40'-0 3/4", 6th=50'-0 3/4", 7th=60'-0 3/4", 8th=70'-0 3/4", 9th=80'-0 3/4", 10th=90'-0 3/4".
5. TOP OF FLOOR JOIST & SUPPORTING LSF BEARING WALLS: 2nd=10'-0", 3rd=20'-0", 4th=30'-0", 5th=40'-0", 6th=50'-0", 7th=60'-0", 8th=70'-0", 9th=80'-0", 10th=90'-0".
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8. STAIR AND SCAFFOLD SYSTEM IS BY OTHERS. SEE SCAFFOLD SUPPLIER/INSTALLER DRAWINGS.
9. C-SHAPE JOIST FRAMING, FLOOR AND ROOF DECK DIAPHRAGM IS SPECIFIED IN THESE LSF PLANS. FLOOR AND ROOF DECK IS 9/16" X 22GA FORMED DECK FASTENED TO LSF FRAMING PER DETAILS WITHIN THESE DRAWINGS.
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11. ALL DIMENSIONS ARE SHOWN FOR ENGINEERING AND CONSTRUCTION PURPOSES. UNIVERSITY OF CALIFORNIA SAN DIEGO SHAKE TABLE LAYOUT IS BASIS OF DESIGN FOR THE TEST PORTION LAYOUT.
12. TRANSFER PLATE MATERIAL, THICKNESS, AND THREADED ROD CONNECTIONS ARE BY UNIVERSITY OF CALIFORNIA SAN DIEGO.

1 1ST LEVEL LSF BEARING WALLS ON SHAKE TABLE
1/2" = 1'-0"

KEYED NOTES
1. STRONGBACK STUD BRACING LOCATION. SEE DETAIL 12/LSF-6.0.

DRAWING LEGEND

SEE SHEET LSF-1.1 AND LSF-1.2 FOR MATERIAL SCHEDULES

Wx	COLD-FORMED STEEL LOAD BEARING WALL (REFERENCE WALL SCHEDULE)
	SHAKE TABLE 1 ¾"Ø x 8" FINE THREAD HOLE - (24" ON-CENTER GRID)
	SHAKE TABLE 2"Ø x 4ft THRU BOLT HOLE - (24" ON-CENTER GRID)
	SHAKE TABLE 2"Ø x 7ft THRU BOLT HOLE - (24" ON-CENTER GRID)
LENGTH SW-x	COLD-FORMED STEEL SHEARWALL - LENGTH CL ENDPOST (REFERENCE SHEARWALL SCHEDULE)

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Revisions
1 For Construction 3/23/22

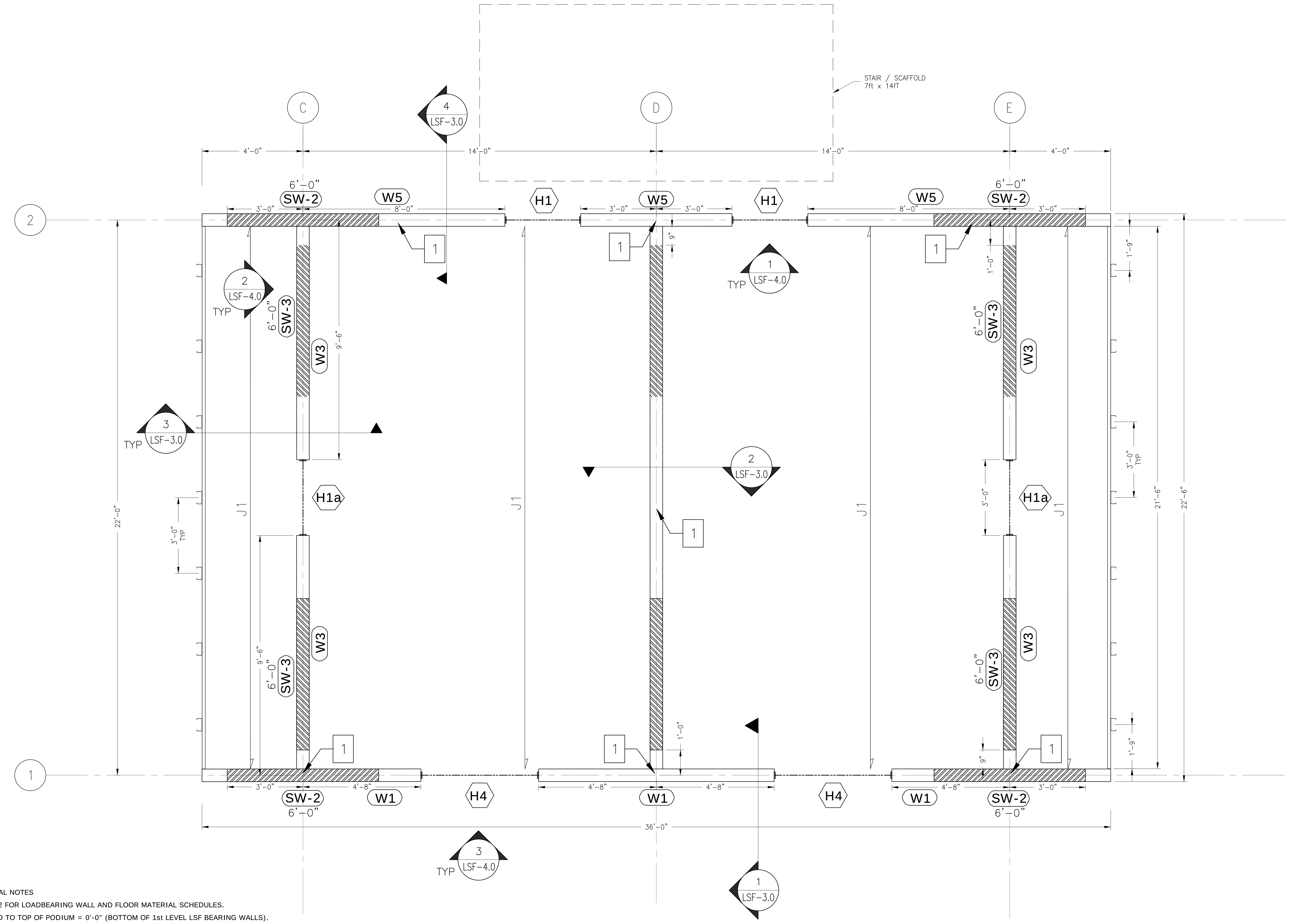
Drawn:	Engineer:	Reviewed:

Date:
10/28/2021

Project Number:
2150200882-1

Sheet Title:
REFERENCE DRAWINGS

Sheet No.
LSF-2.0



1 2nd – 10th FLOOR FRAMING OVER 1st – 9th LEVEL LSF BEARING WALLS
1/2" = 1'-0"

DRAWING NOTES

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12. CORNER ZONE 5 OCCURS WITHIN 5'-0" OF OUTER PROMINENT BUILDING CORNERS. THESE AREAS ARE DESIGN FOR CORNER ZONE WIND LOAD. SEE DETAIL FOR EXTERIOR SHEATHING ATTACHMENT.

KEYED NOTES

1. STRONGBACK STUD BRACING LOCATION. SEE DETAIL 12/LSF-6.0.

DRAWING LEGEND

SEE SHEET LSF-1.1 AND LSF-1.2 FOR MATERIAL SCHEDULES

Wx	COLD-FORMED STEEL LOAD BEARING WALL (REFERENCE WALL SCHEDULE)
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Drawn:	Engineer:	Reviewed:

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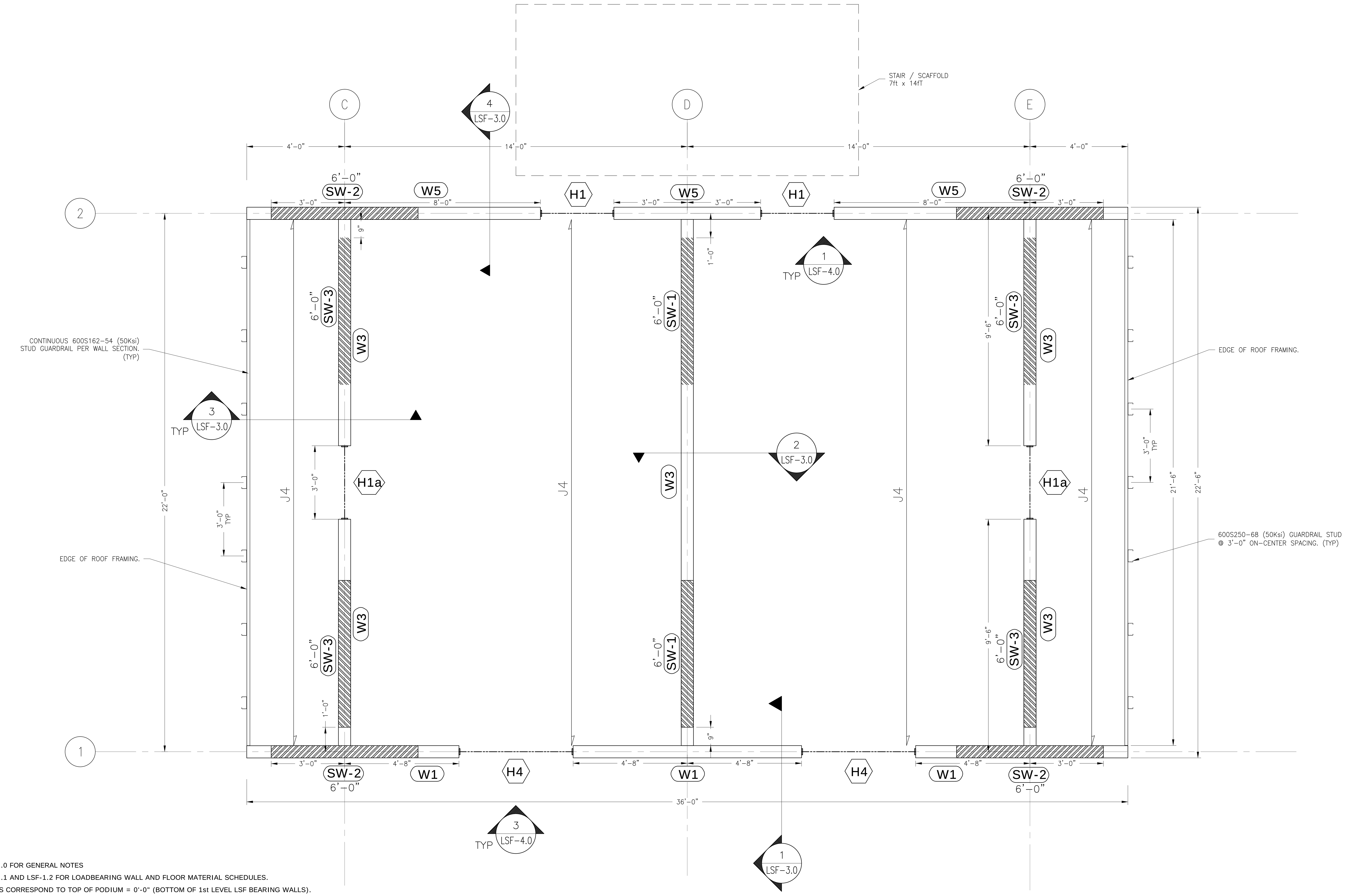
Project Number: 2150200882-1

Sheet Title: REFERENCE DRAWINGS

Sheet No. LSF-2.1



1 ROOF FRAMING OVER 10th LEVEL LSF BEARING WALLS
1/2" = 1'-0"

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Revisions

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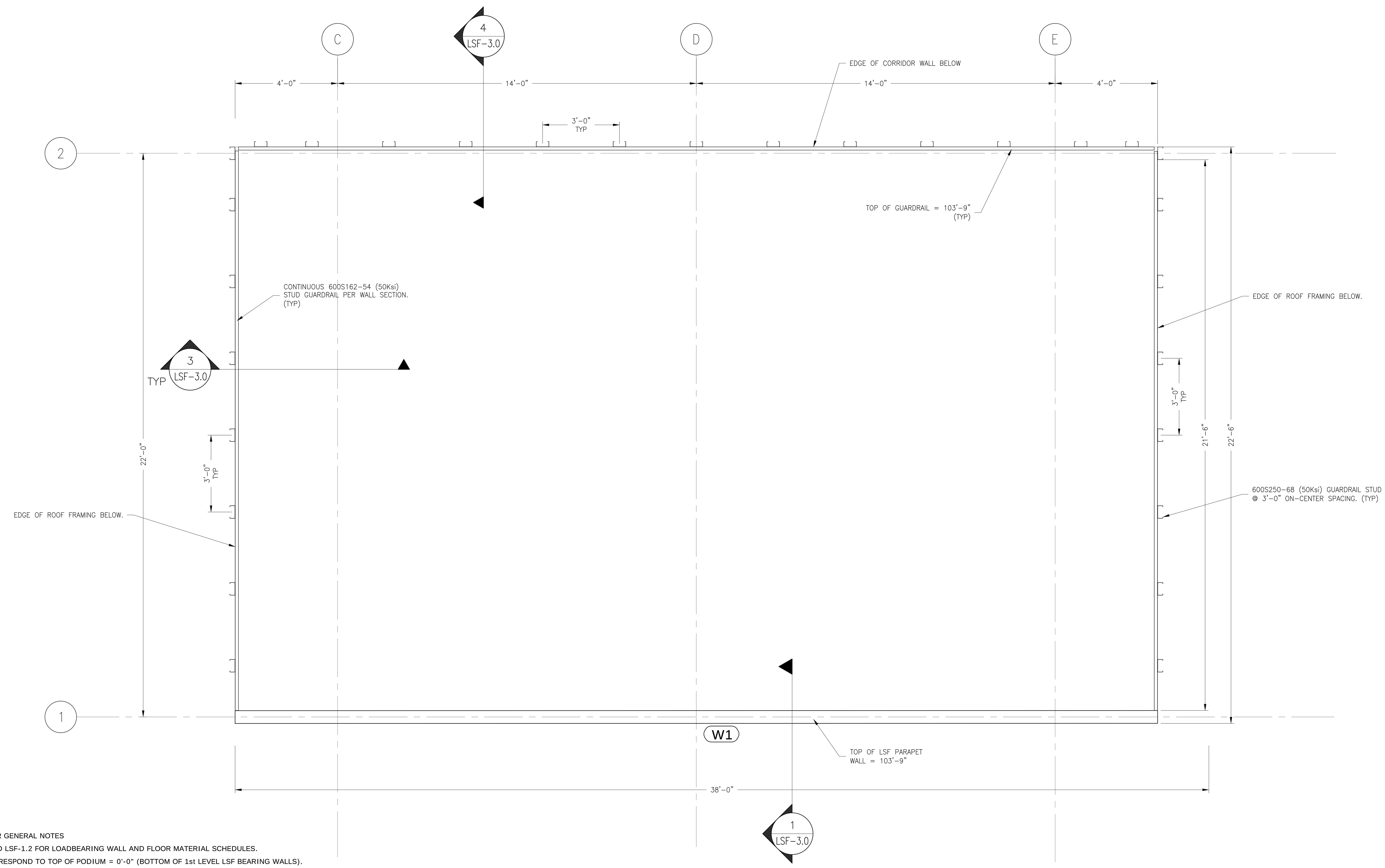
Drawn:	Engineer:	Reviewed:

Date: 10/28/2021

Project Number: 2150200882-1

Sheet Title: WALL SECTIONS

Sheet No. LSF-2.2



1 ROOFTOP PARAPET FRAMING
1/2" = 1'-0"

DRAWING NOTES

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Revisions

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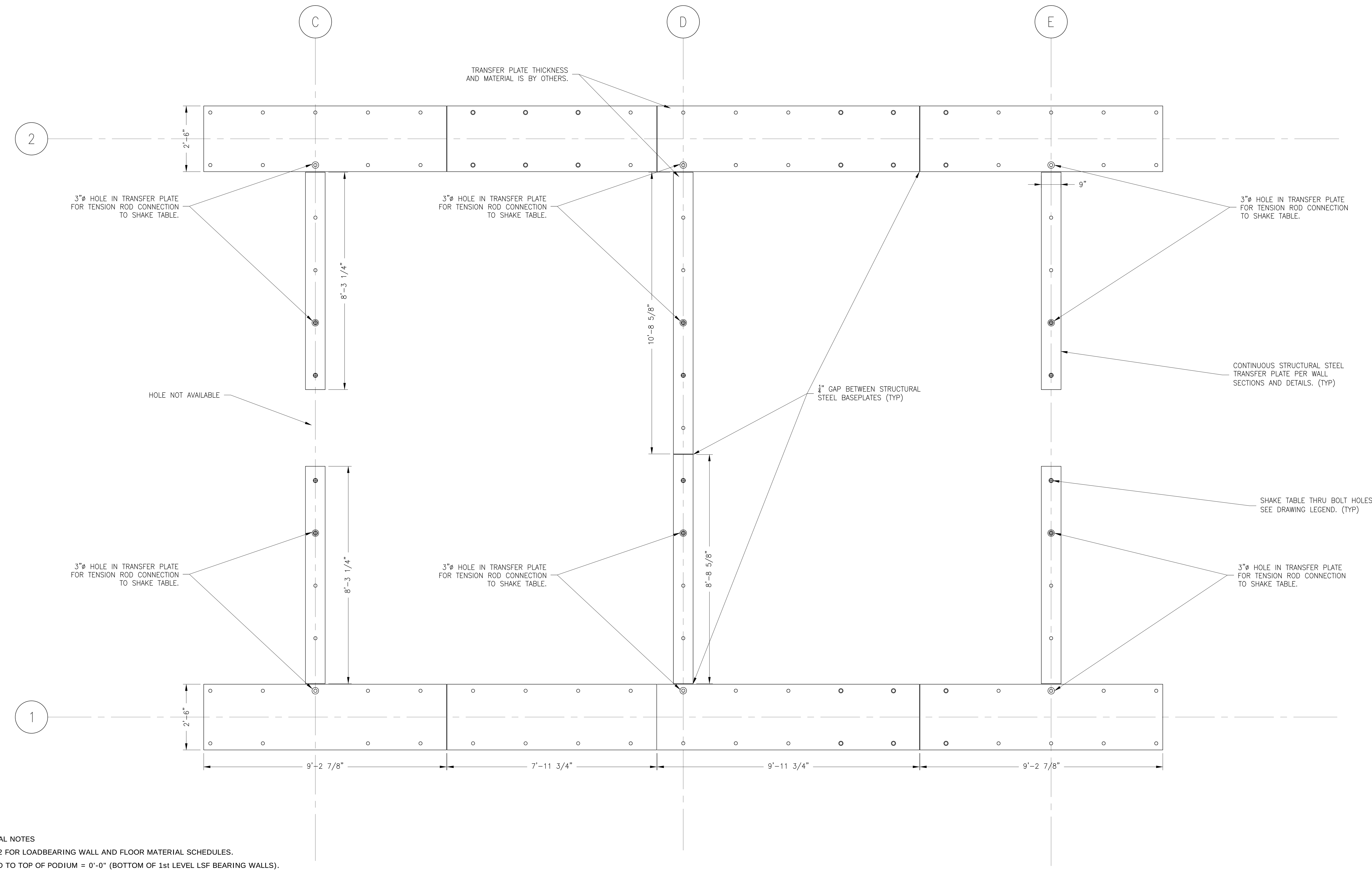
Sheet Title: WALL SECTIONS

Sheet No. LSF-2.3



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1 SHAKE TABLE TRANSFER PLATE LAYOUT
1/2" = 1'-0"

N

DRAWING LEGEND

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Revisions

1 For Construction	3/23/22

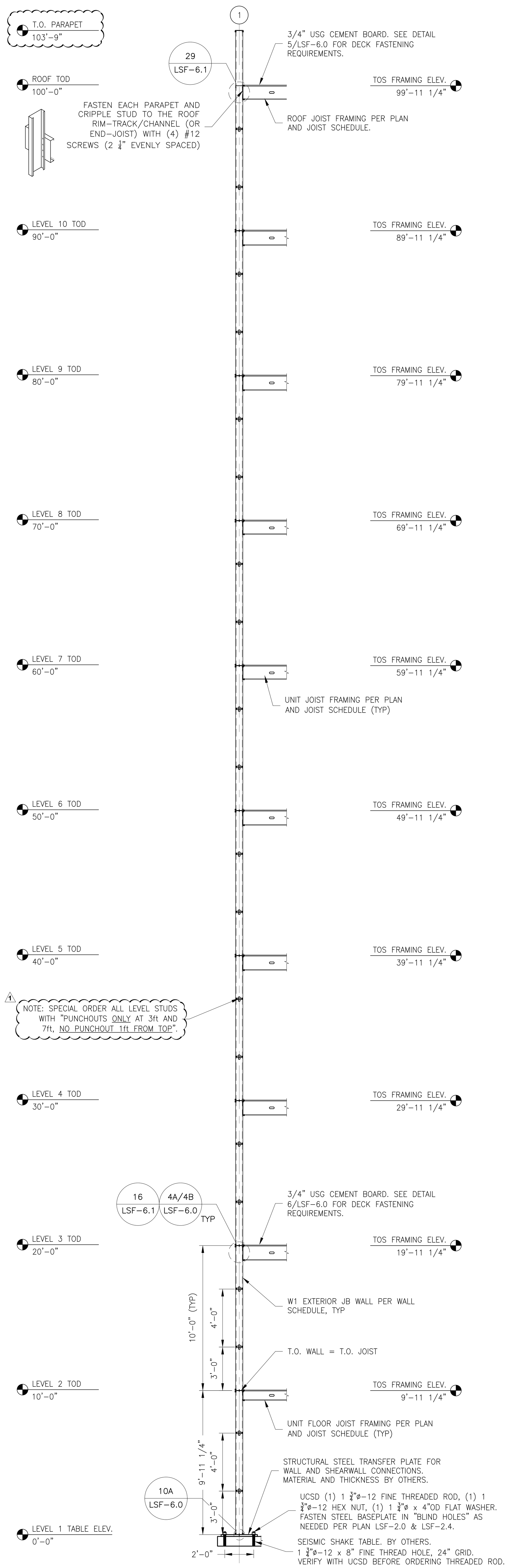
Drawn:	Engineer:	Reviewed:

Date: 10/28/2021

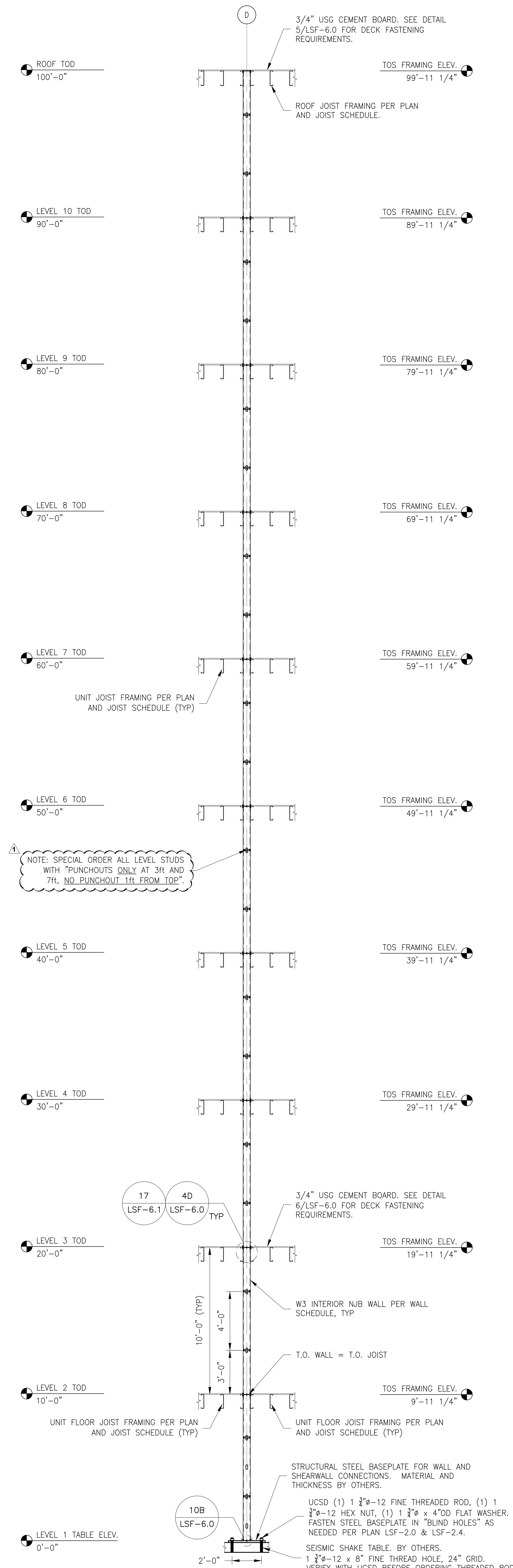
Project Number: 2150200882-1

Sheet Title: REFERENCE DRAWINGS

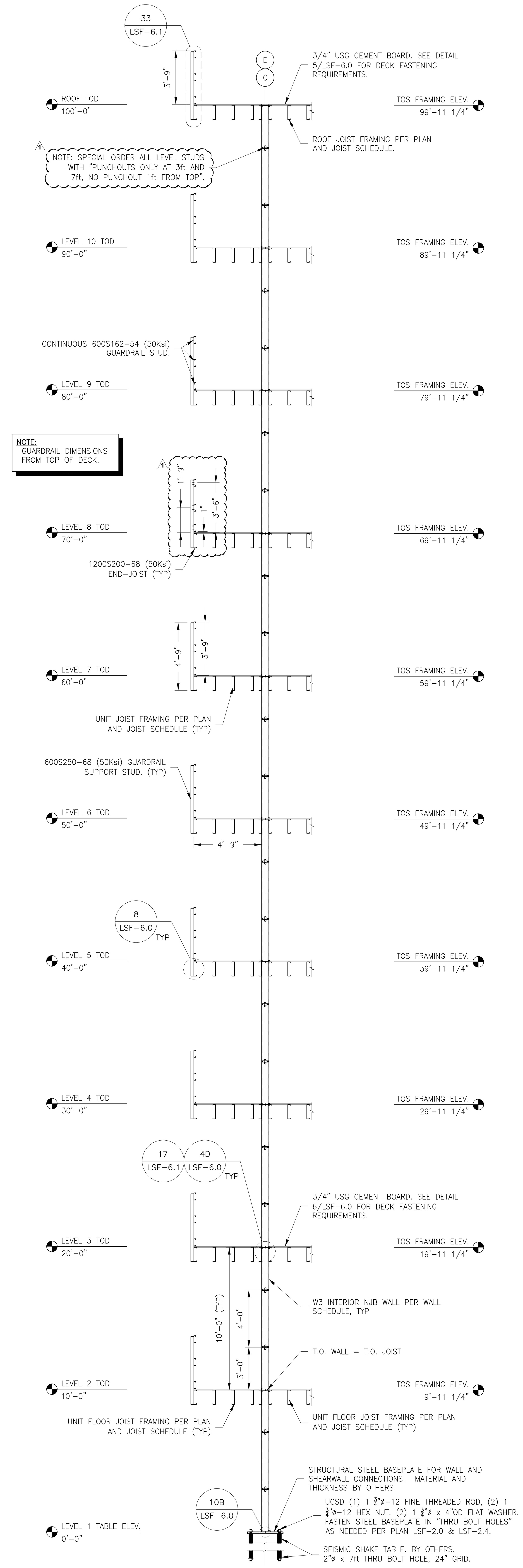
Sheet No. LSF-2.4



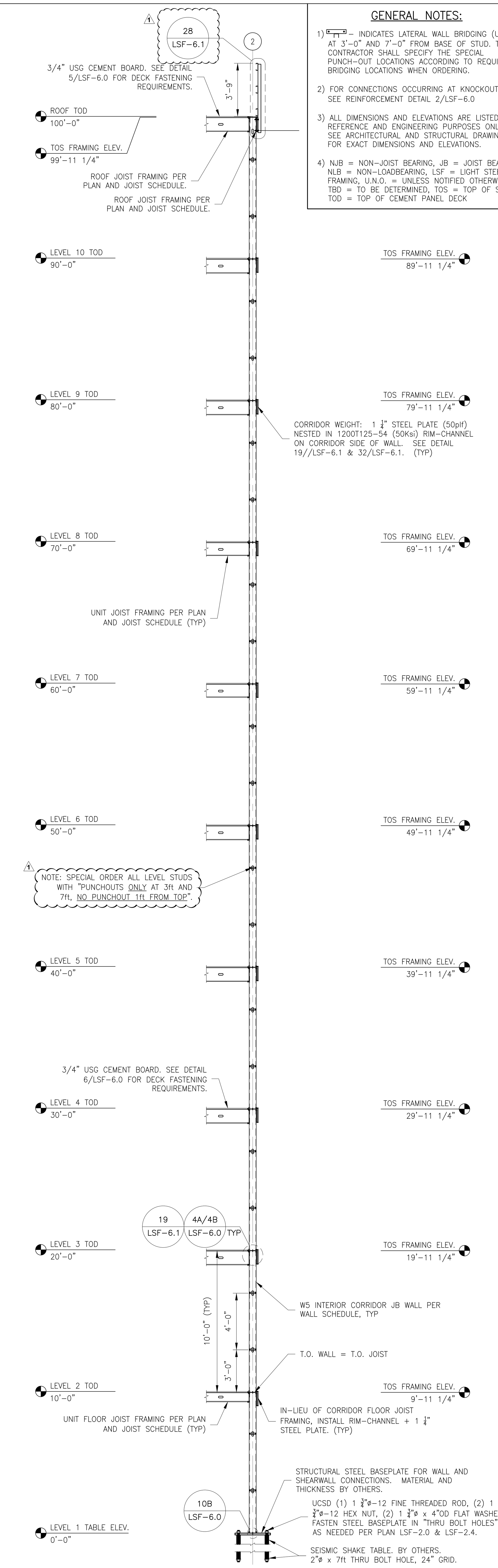
1 EXTERIOR W1 JB WALL SECTION



2 INTERIOR W3 NJB WALL SECTION



3 INTERIOR W3 NJB WALL SECTION
WITH EXTERIOR GUARDRAIL



4 INTERIOR W5 CORRIDOR JB WALL SECTION

GENERAL NOTES:

1) – INDICATES LATERAL WALL BRIDGING (U.N.O.) AT 3'-0" AND 7'-0" FROM BASE OF STUD. THE CONTRACTOR SHALL SPECIFY THE SPECIAL PUNCH-OUT LOCATIONS ACCORDING TO REQUIRED BRIDGING LOCATIONS WHEN ORDERING.

2) FOR CONNECTIONS OCCURRING AT KNOCKOUTS, SEE REINFORCEMENT DETAIL 2/LSF-6.0

3) ALL DIMENSIONS AND ELEVATIONS ARE LISTED FOR REFERENCE AND ENGINEERING PURPOSES ONLY. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT DIMENSIONS AND ELEVATIONS.

4) NJB = NON-JOIST BEARING, JB = JOIST BEARING, NLB = NON-LOADBEARING, LSF = LIGHT STEEL FRAMING, U.N.O. = UNLESS NOTIFIED OTHERWISE, TBD = TO BE DETERMINED, TOS = TOP OF STEEL, TOD = TOP OF CEMENT PANEL DECK

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ClarkDietrich. ENGINEERING DESIGN INC.

CFS-NHERI 10-Story Test Portion

Project Location:
San Diego, California

Prepared For:
Cold-Formed Steel Research Consortium
CFSRC - 208 Latrobe Hall
Baltimore, Maryland
(t) (410) 516-8680

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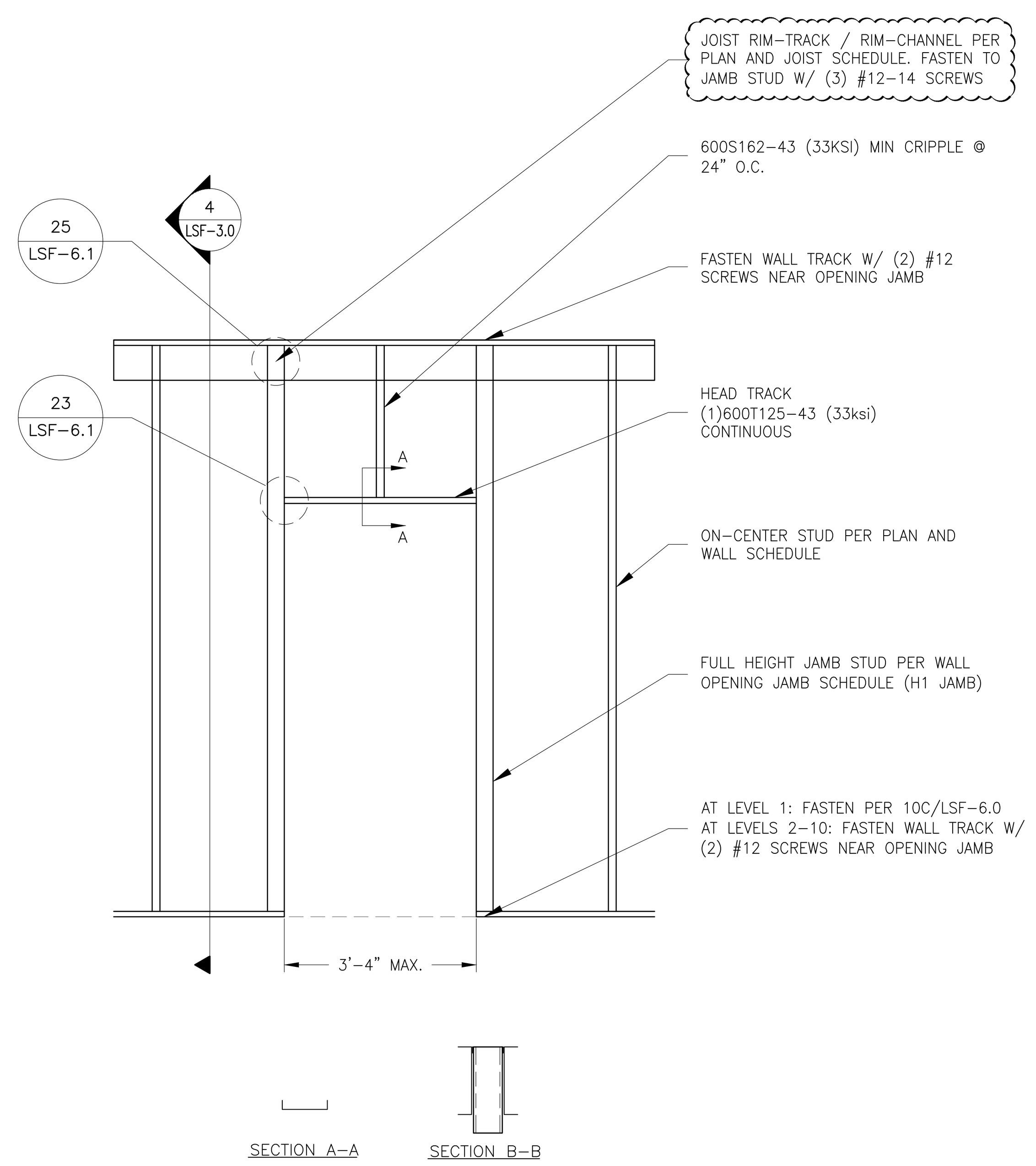
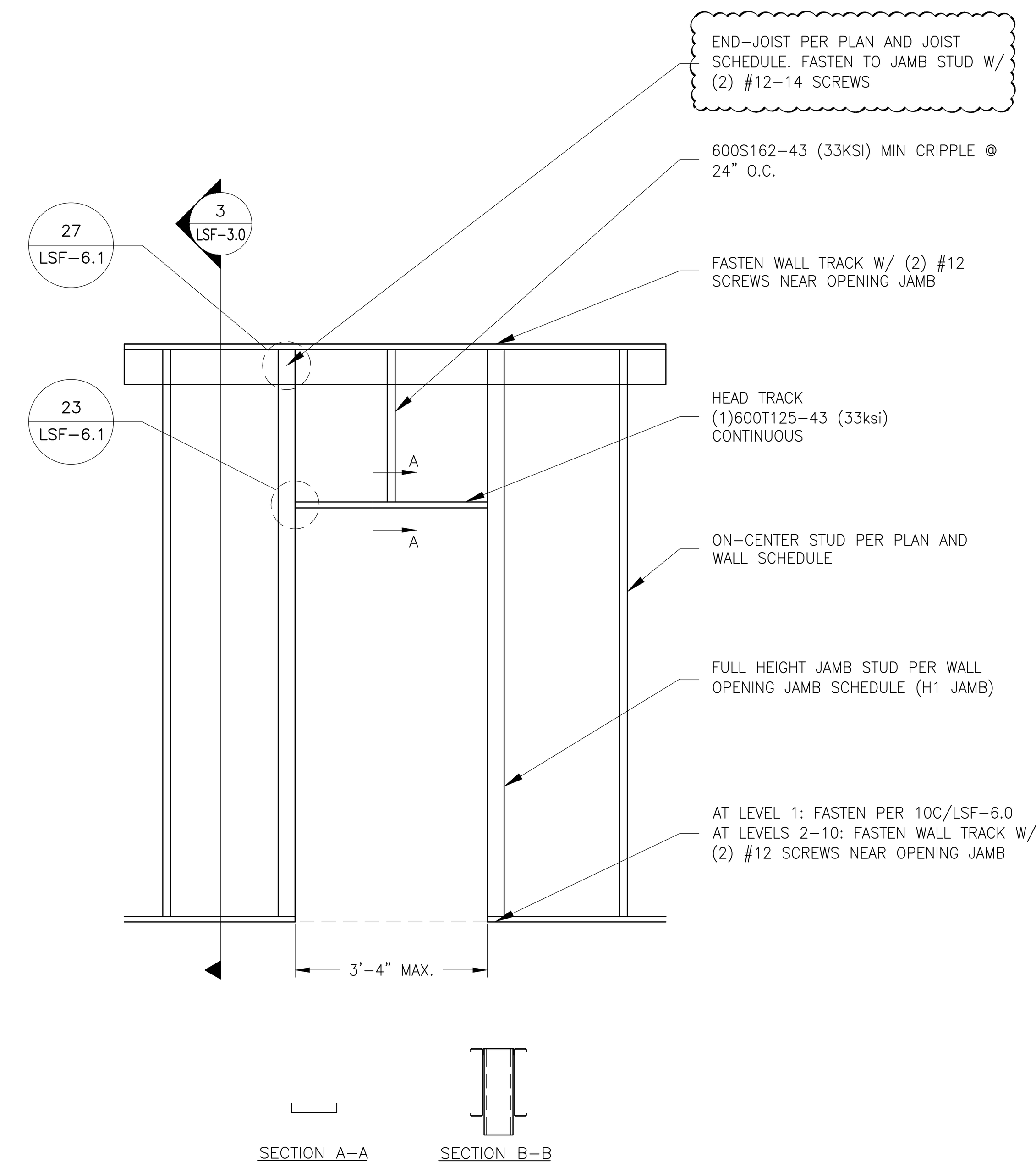
Project Number: 2150200882-1

Sheet Title: WALL SECTIONS

Sheet No. LSF-3.0



1 OPENING FRAMING
H1 (LEVELS 1-10)



2 OPENING FRAMING
H1a (LEVELS 1-10)

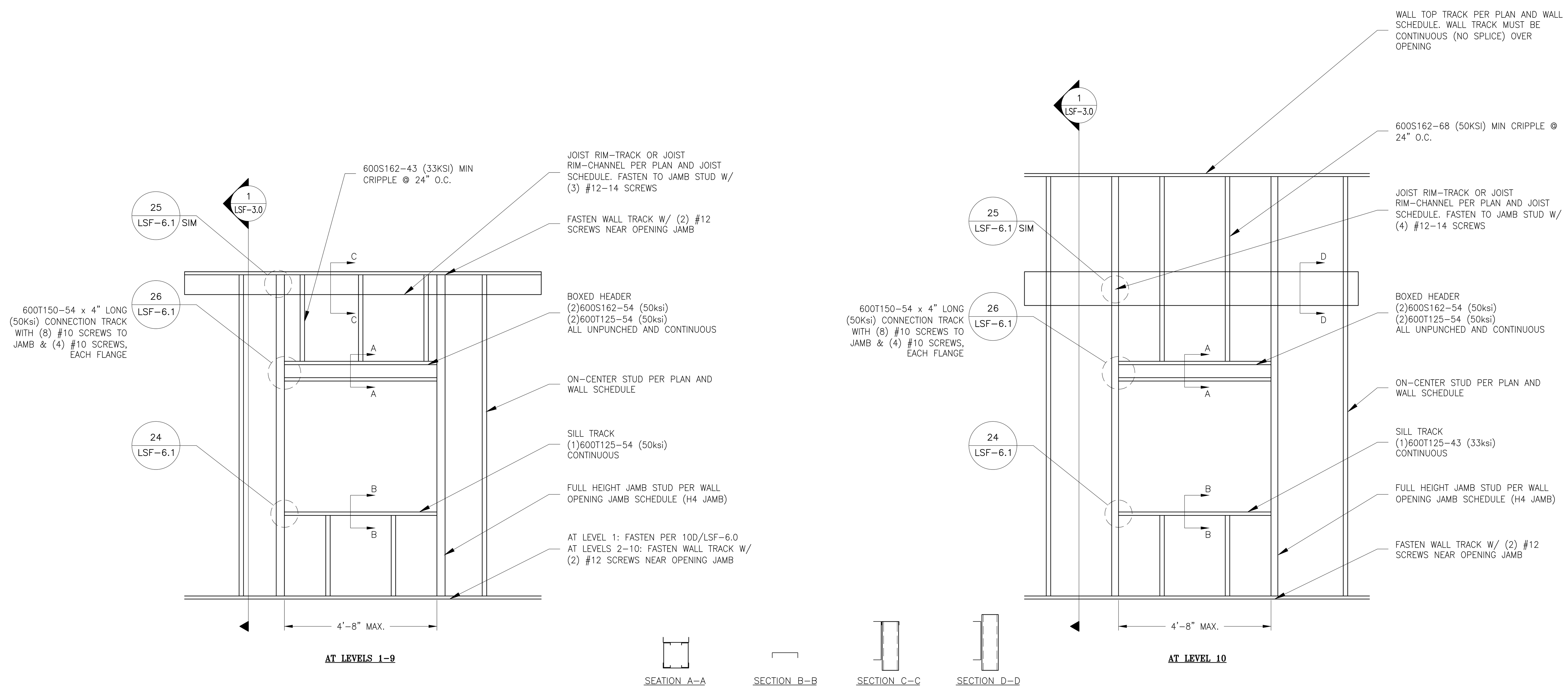
GENERAL NOTES:

1) ALL DIMENSIONS AND ELEVATIONS ARE LISTED FOR REFERENCE AND ENGINEERING PURPOSES ONLY. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT DIMENSIONS AND ELEVATIONS.

2) CRIPPLE STUD SIZE, GAUGE, YIELD STRENGTH, SPACING, AND CONNECTIONS TO STRUCTURE TO BE THE SAME AS WALL STUDS – REFERENCE WALL SECTIONS (U.N.O.).

3) FOR CONNECTIONS OCCURRING AT KNOCKOUTS, SEE REINFORCEMENT DETAIL 2/LSF-6.0.

4) NJB = NON-JOIST BEARING, JB = JOIST BEARING, NLB = NON-LOADBEARING, LSF = LIGHT STEEL FRAMING, U.N.O. = UNLESS NOTIFIED OTHERWISE, TBD = TO BE DETERMINED, TOS = TOP OF STEEL, TOD = TOP OF CEMENT PANEL DECK



3 OPENING FRAMING
H4 (LEVELS 1-10)

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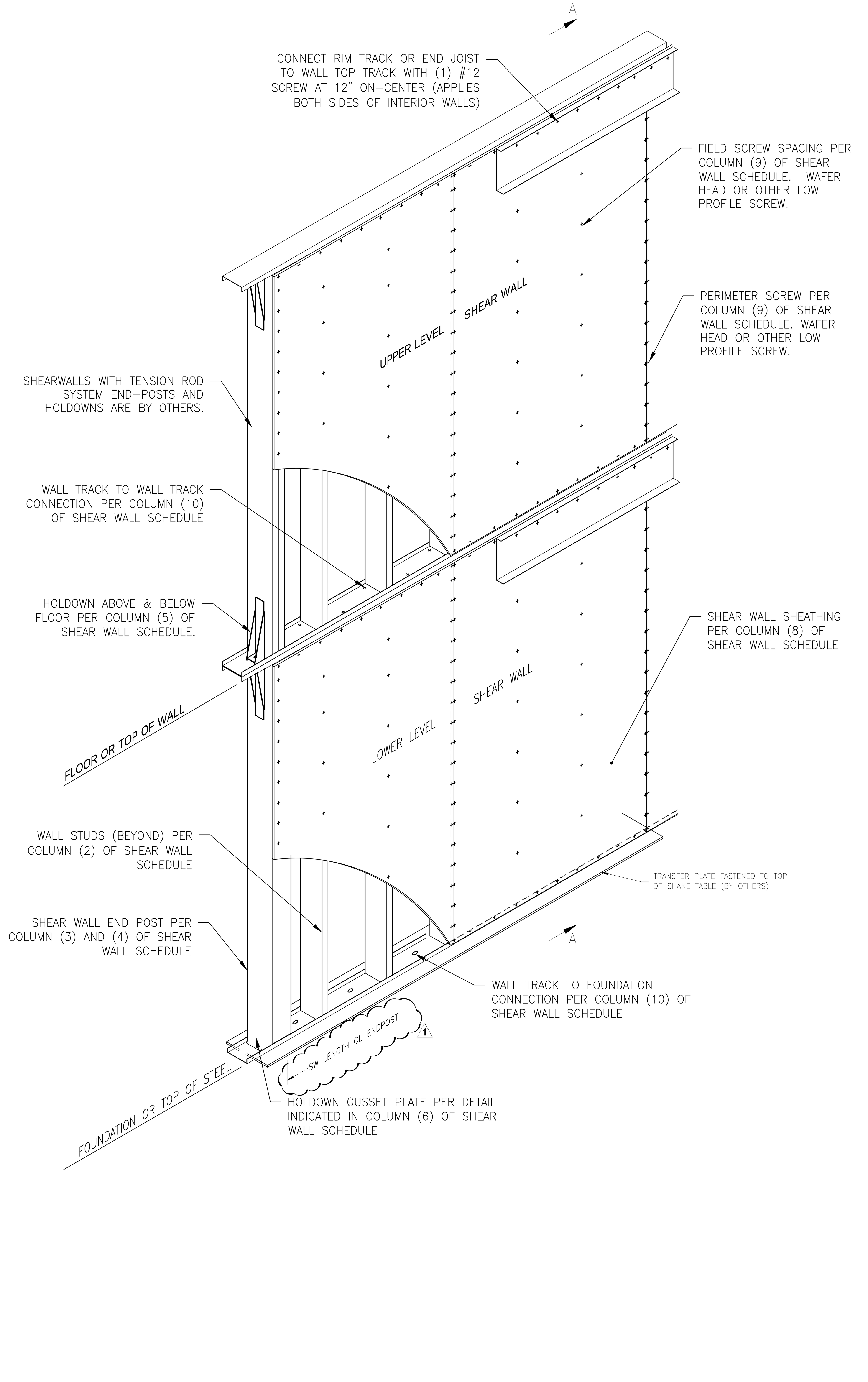
Project Number: 2150200882-1

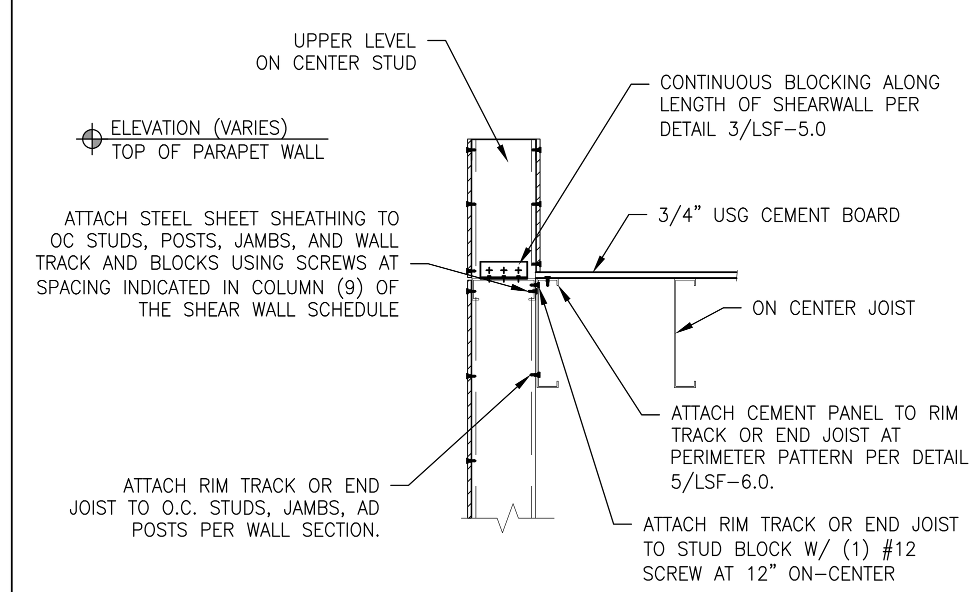
Sheet Title: OPENING FRAMING

Sheet No. LSF-4.0

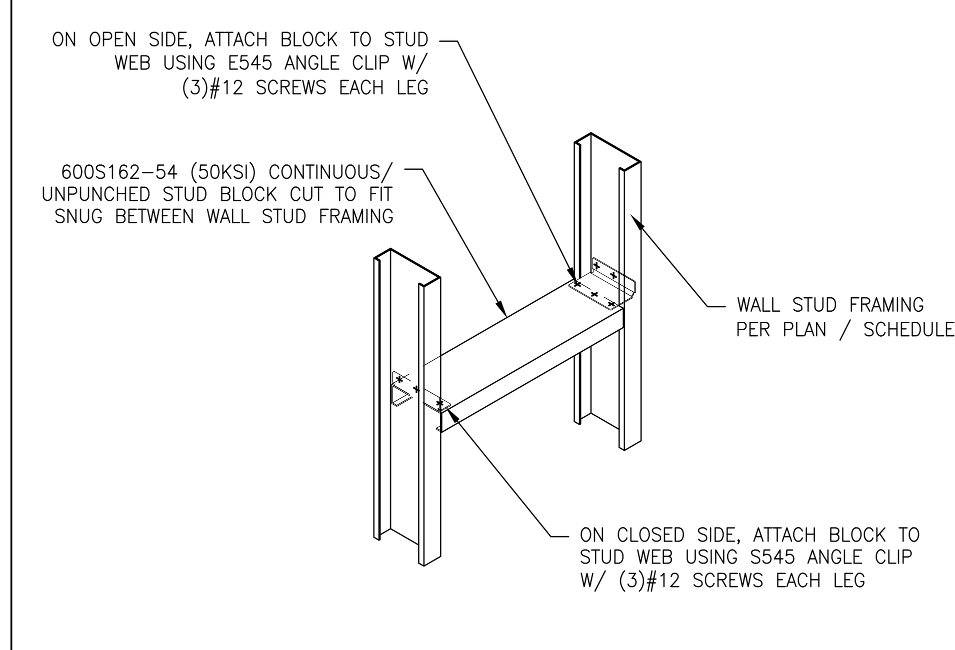


1 TYPICAL SHEARWALL SHEATHING ELEVATION

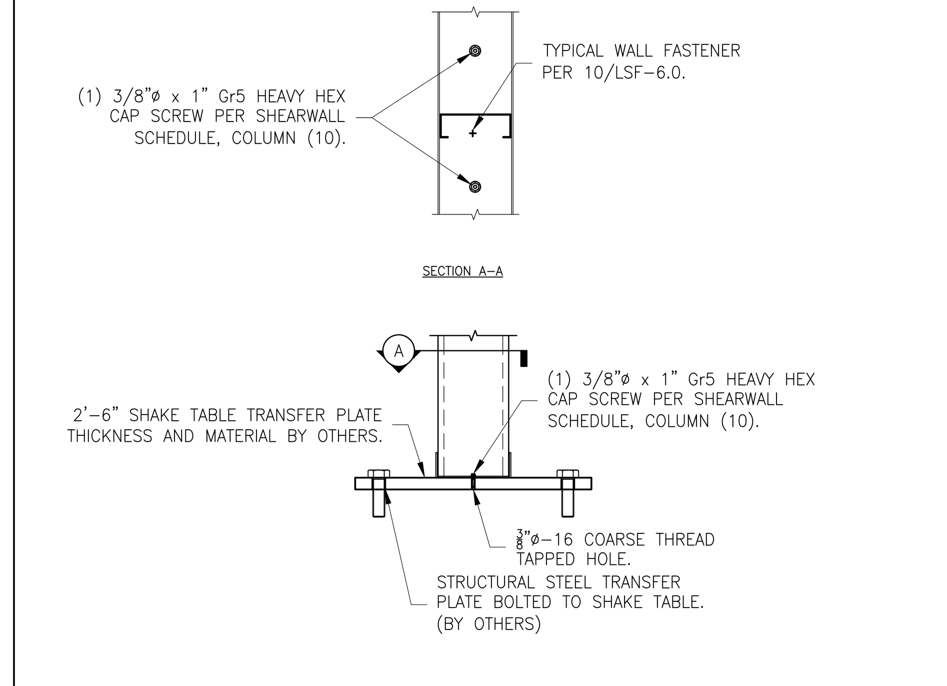
NOTE:
1.) SHEAR WALL SHEATHING MAY STOP AT WALL BLOCKING OR CONTINUE TO TOP OF PARAPET. PERIMETER SCREW PATTERN IS REQUIRED AT BLOCKING.



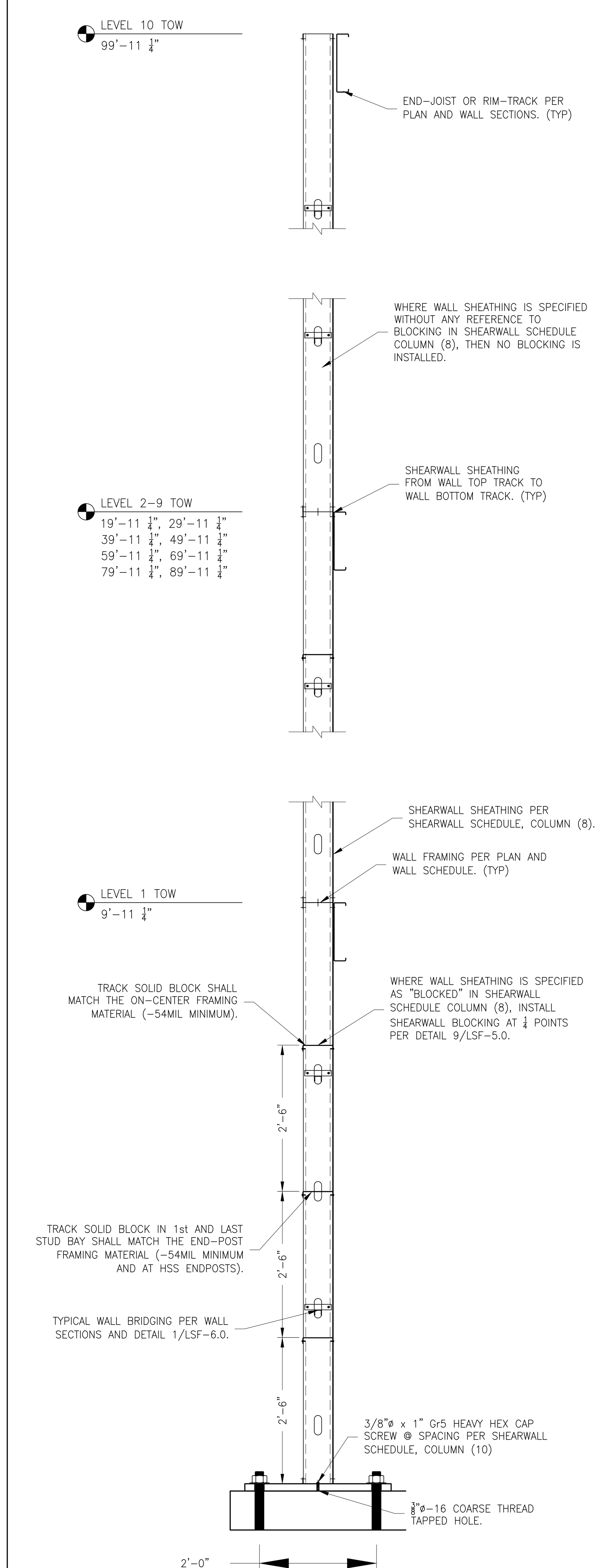
2 EXTERIOR SHEARWALL AT ROOF PARAPET
SW-2 EXTERIOR W1 WALL



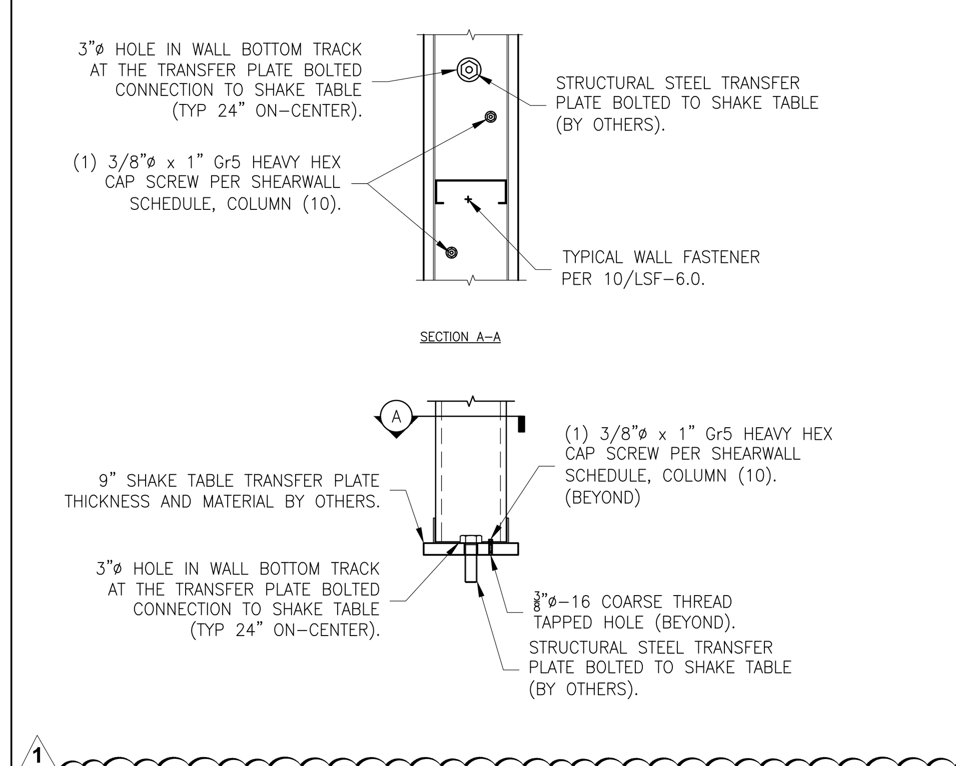
3 STUD BLOCKING AT ROOF PARAPET
SW-2 EXTERIOR W1 WALL



4a SHEARWALL TRACK CONN. AT SHAKE TABLE
SW-2

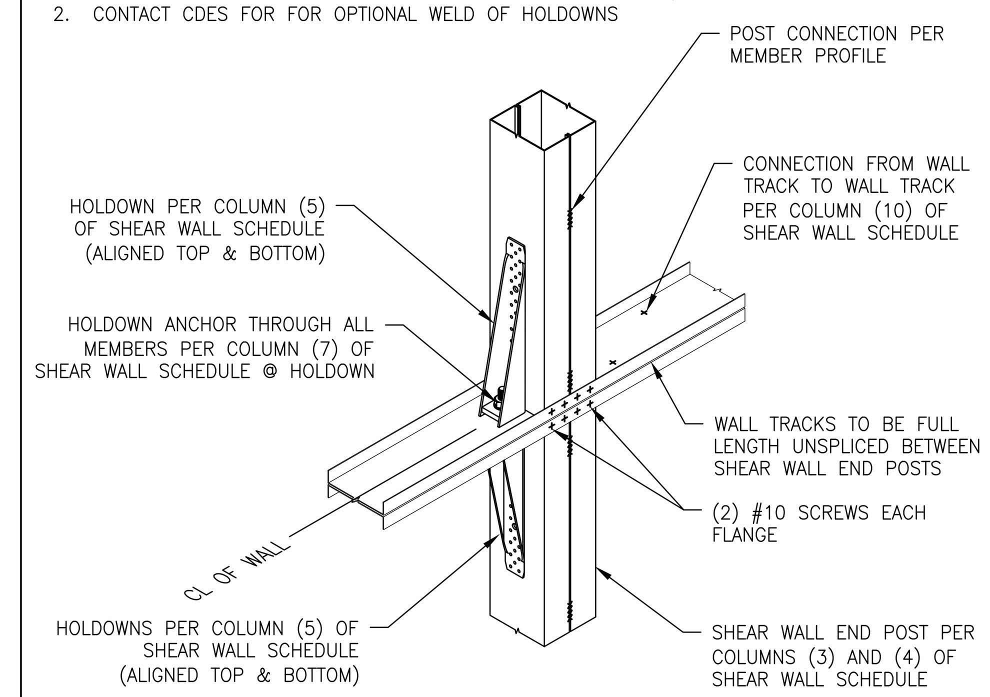


SECTION A-A
1



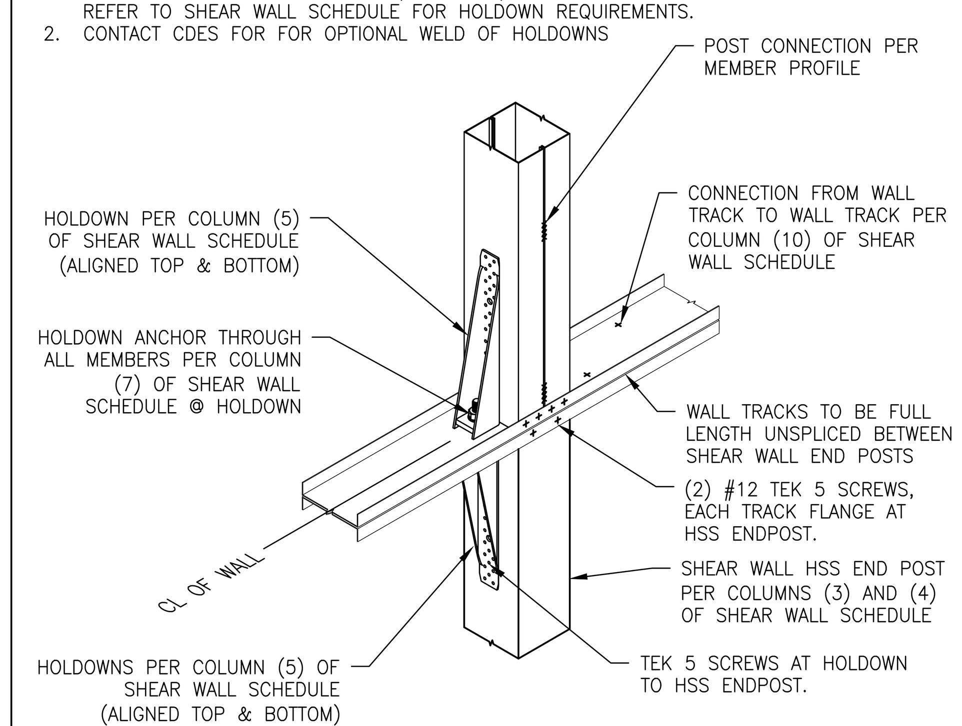
4b SHEARWALL TRACK CONN. AT SHAKE TABLE
SW-1 & SW-3

NOTES:
1. HOLDOWNS MAY OCCUR ON ONE (AS SHOWN) OR BOTH SIDES OF END POST. REFER TO SHEAR WALL SCHEDULE FOR HOLDOWN REQUIREMENTS.
2. CONTACT CDES FOR FOR OPTIONAL WELD OF HOLDOWNS



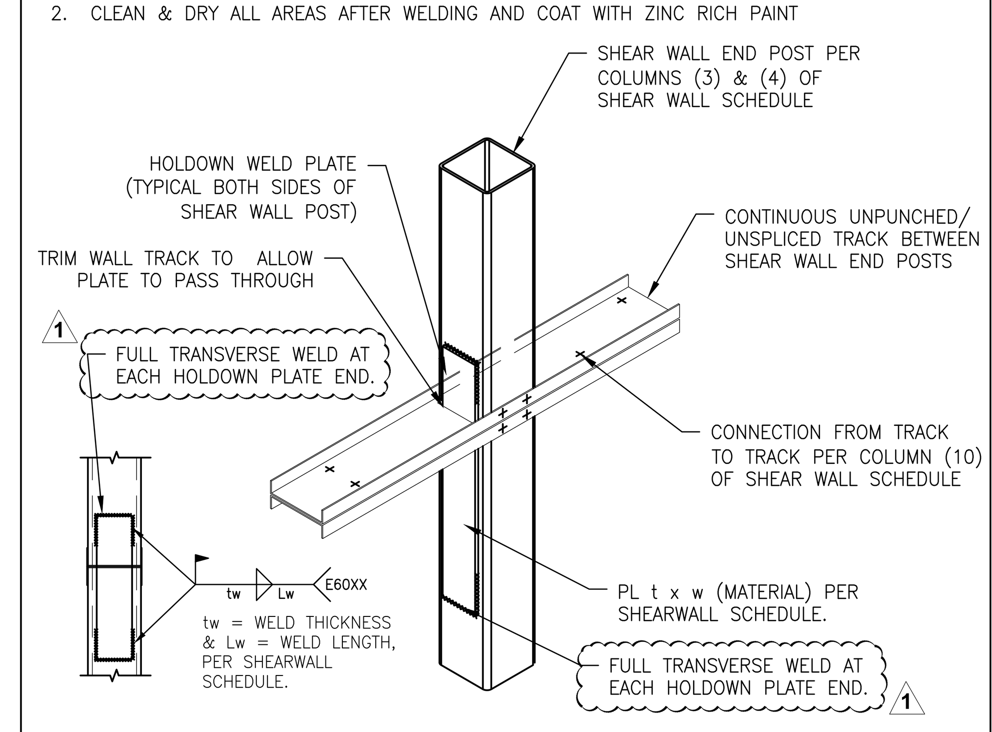
5 HOLDOWN AT LSF END-POST
TYPICAL

NOTES:
1. HOLDOWNS MAY OCCUR ON ONE (AS SHOWN) OR BOTH SIDES OF END POST. REFER TO SHEAR WALL SCHEDULE FOR HOLDOWN REQUIREMENTS.
2. CONTACT CDES FOR FOR OPTIONAL WELD OF HOLDOWNS



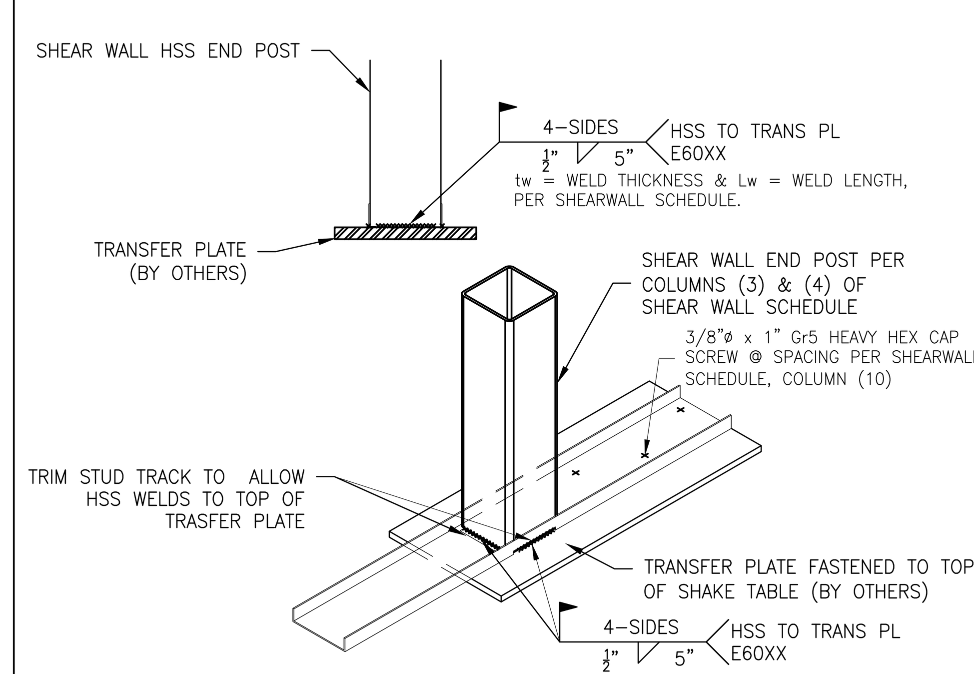
6 HOLDOWN AT HSS END-POST
TYPICAL

NOTES:
1. CLEAN ALL AREAS PRIOR TO WELDING
2. CLEAN & DRY ALL AREAS AFTER WELDING AND COAT WITH ZINC RICH PAINT

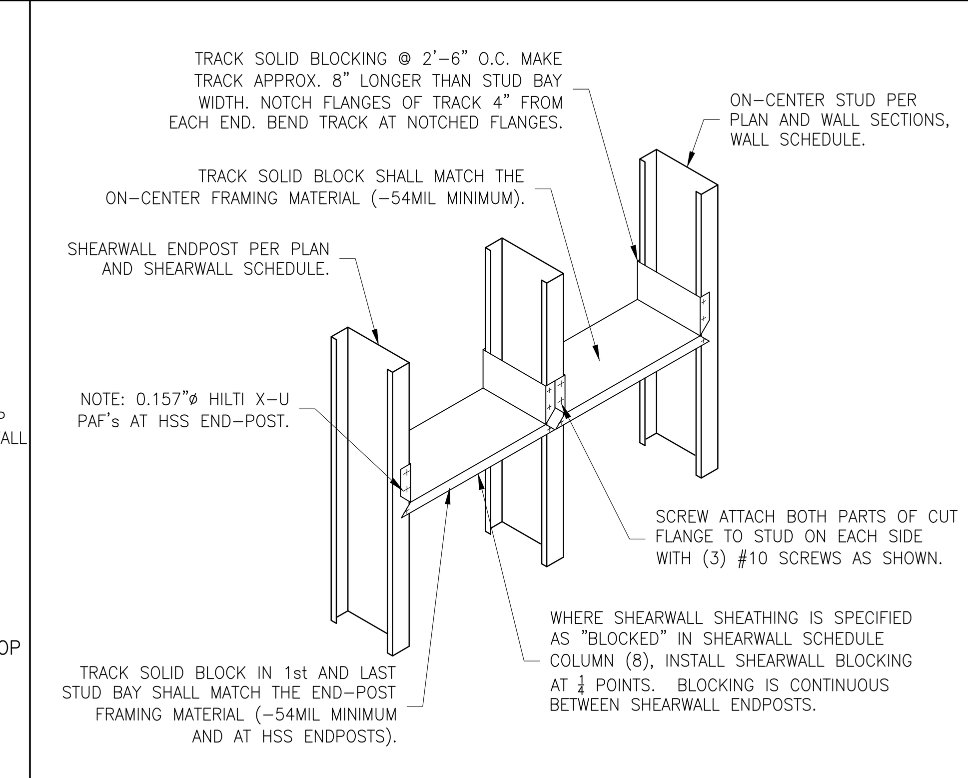


7 PLATE HOLDOWN AT HSS END-POST
TYPICAL

NOTES:
1. CLEAN ALL AREAS PRIOR TO WELDING
2. CLEAN & DRY ALL AREAS AFTER WELDING AND COAT WITH ZINC RICH PAINT



8 HOLDOWN GUSSET FROM HSS TO EMBED.
TYPICAL



9 SHEARWALL SOLID BLOCKING

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CFS-NHERI 10-Story Test Portion
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Drawn:	Engineer:	Reviewed:

Date: 10/29/2021
Project Number: 2150200882-1
Sheet Title: SHEARWALL ELEV. & DETAILS
Sheet No. LSF-5.0

EACH END OF LATERAL BRACING MUST BE RIGIDLY FIXED OR OTHERWISE PREVENTED FROM HORIZONTAL MOVEMENT. SEE STRONGBACK DETAIL 12/LSF-6.1.	
ClarkDietrich FB FASTBRIDGE CLIPS CAN NOT BE USED AT BACK-TO-BACK POSTS, JAMBS AND SHEARWALL END-POSTS. SEE TABLE 3.	

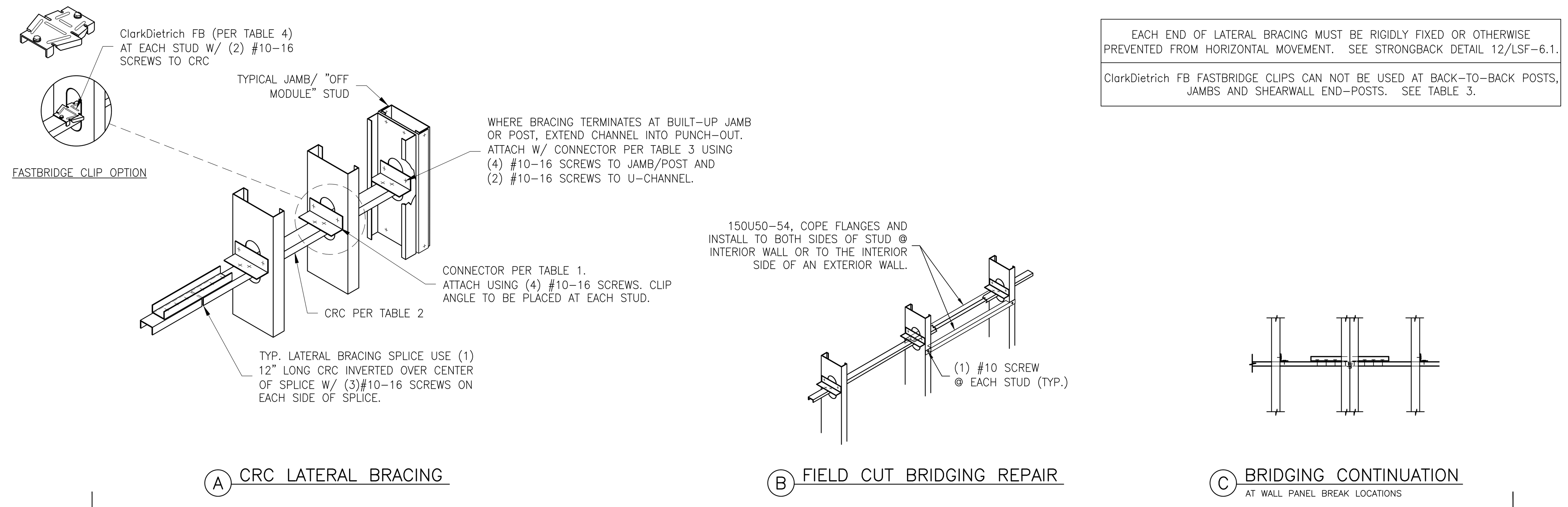


TABLE 1

STUD WIDTH	CONNECTOR
6"	ClarkDietrich U545/X545

TABLE 2

STUD WIDTH	CRC
3-1/2" - 8"	ClarkDietrich 150U50-54

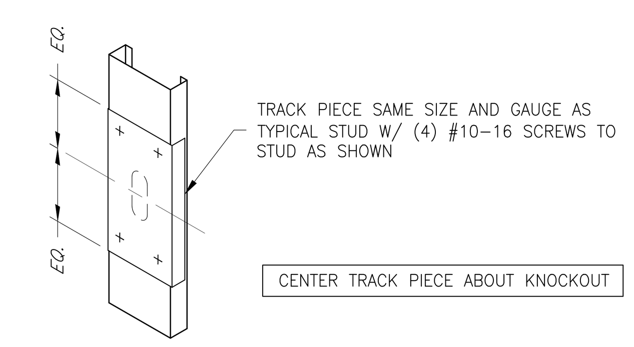
TABLE 3

STUD WIDTH	CONNECTOR
6"	ClarkDietrich B545

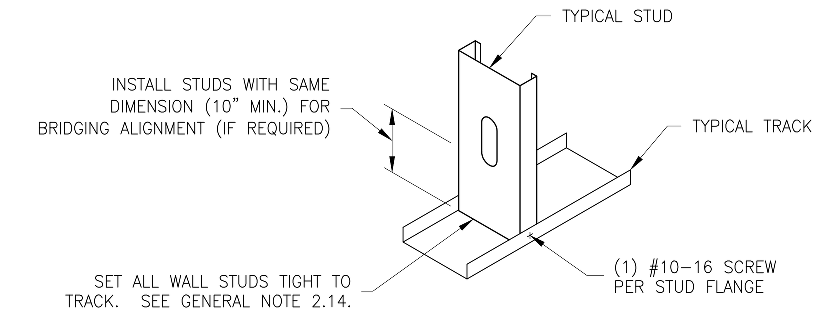
TABLE 4

STUD THICKNESS	CONNECTOR
33 - 43 MIL	ClarkDietrich FB-43
54 - 97 MIL	ClarkDietrich FB-68

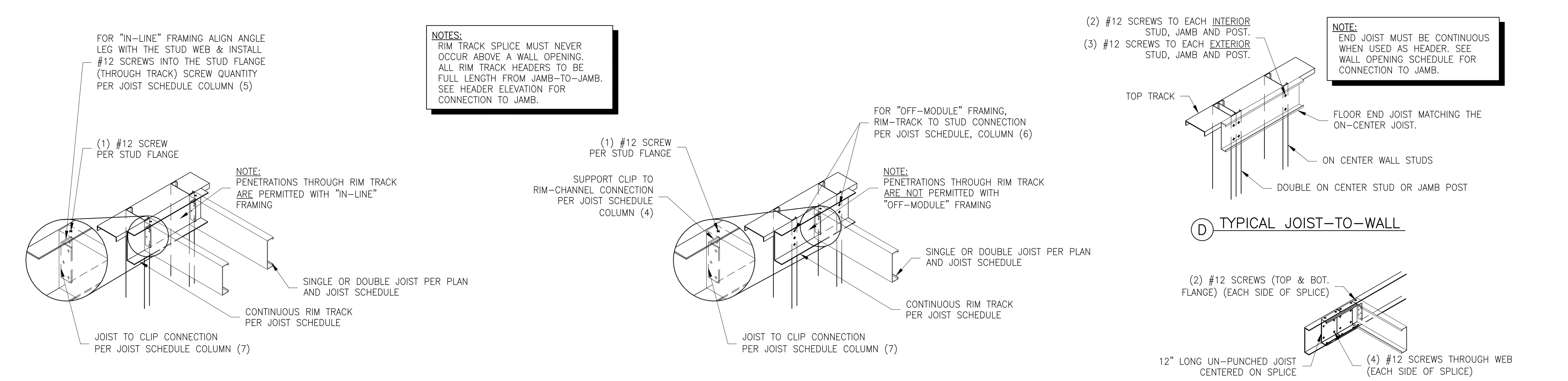
1 TYPICAL LATERAL BRACING



2 KNOCKOUT DETAIL
TYPICAL AT CONNECTIONS

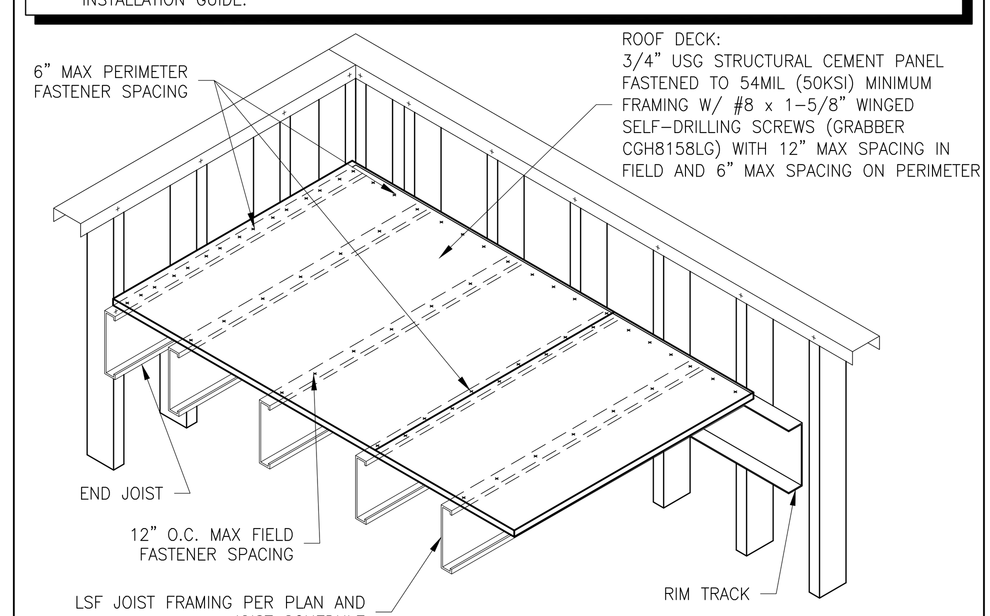


3 STUD-TO-TRACK DETAIL



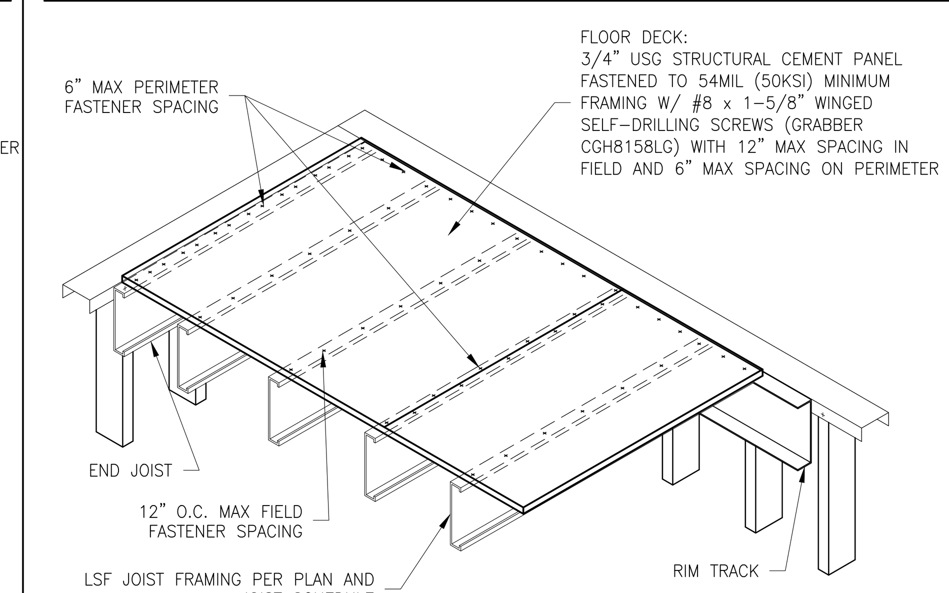
4 JOIST AND END-JOIST CONNECTIONS
TYPICAL UNLESS NOTED OTHERWISE

NOTE:
1. MAX. 6" O.C. PERIMETER FASTENER SPACING AT END JOISTS & RIM TRACK CONNECTIONS AT FLOORS.
2. 2-SPAN MINIMUM. 1-SPAN INSTALL REQUIRES A MID-SPAN JOIST BLOCK.
3. ALL CONNECTIONS TO CFS ARE MADE WITH #8 x 1-5/8" WINGED SELF-DRILLING SCREWS IN 54MIL (50KSI) MIN FRAMING.
4. IN ADDITION TO THIS DETAIL, SEE THE USG STRUCTURAL PANEL CONCRETE ROOF DECK FIELD INSTALLATION GUIDE.



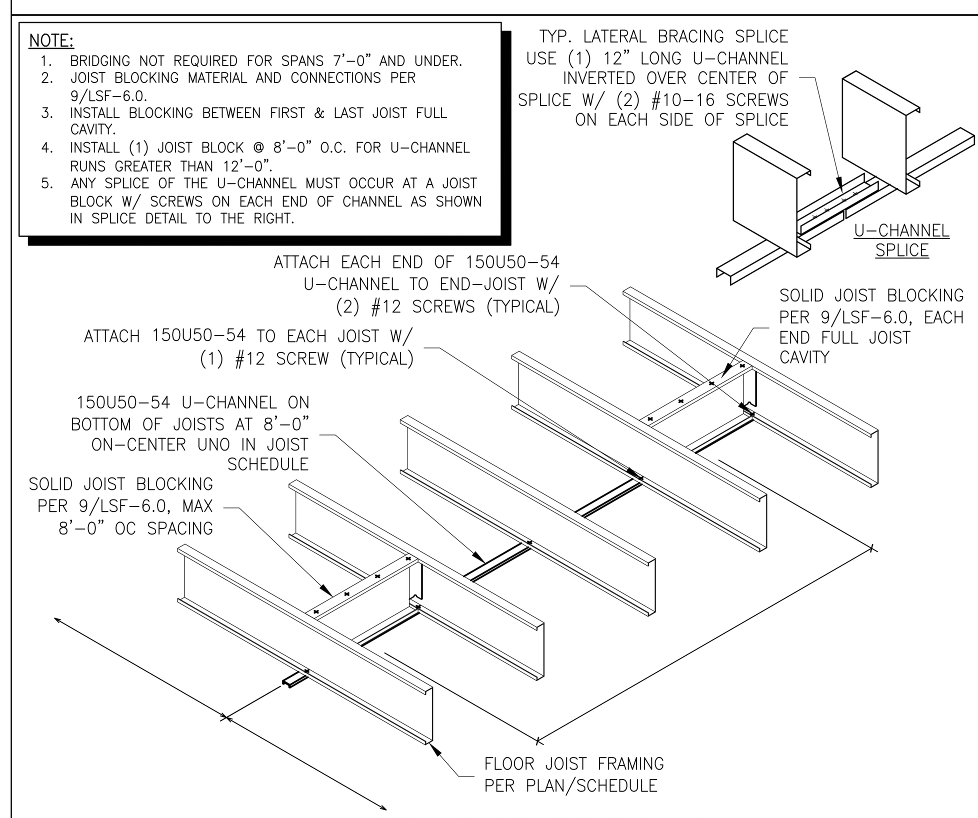
5 ROOF DECK CONNECTION TO FRAMING
AT LSF PARAPET WALL

NOTE:
1. MAX. 6" O.C. PERIMETER FASTENER SPACING AT END JOISTS & RIM TRACK CONNECTIONS AT FLOORS.
2. 2-SPAN MINIMUM. 1-SPAN INSTALL REQUIRES A MID-SPAN JOIST BLOCK.
3. ALL CONNECTIONS TO CFS ARE MADE WITH #8 x 1-5/8" WINGED SELF-DRILLING SCREWS IN 54MIL (50KSI) MIN FRAMING.
4. IN ADDITION TO THIS DETAIL, SEE THE USG STRUCTURAL PANEL CONCRETE SUBFLOOR FIELD INSTALLATION GUIDE.

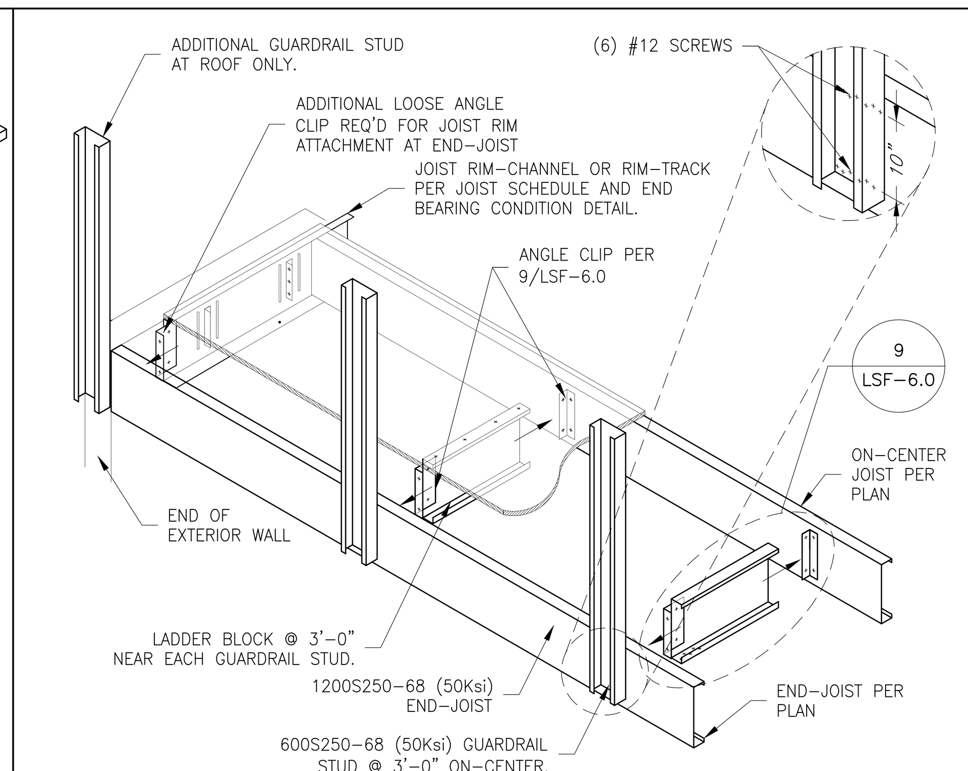


6 FLOOR DECK CONNECTION TO FRAMING
Ref. Plan Notes from Structural Plans

NOTE:
1. BRIDGING NOT REQUIRED FOR SPANS 7'-0" AND UNDER.
2. JOIST BLOCKING MATERIAL AND CONNECTIONS PER 9/LSF-6.0.
3. INSTALL BLOCKING BETWEEN FIRST & LAST JOIST FULL CAVITY.
4. INSTALL (1) JOIST BLOCK @ 8'-0" O.C. FOR U-CHANNEL RUNS GREATER THAN 12'-0".
5. ANY SPLICE OF THE U-CHANNEL MUST OCCUR AT A JOIST BLOCK W/ SCREWS ON EACH END OF CHANNEL AS SHOWN IN SPLICE DETAIL TO THE RIGHT.



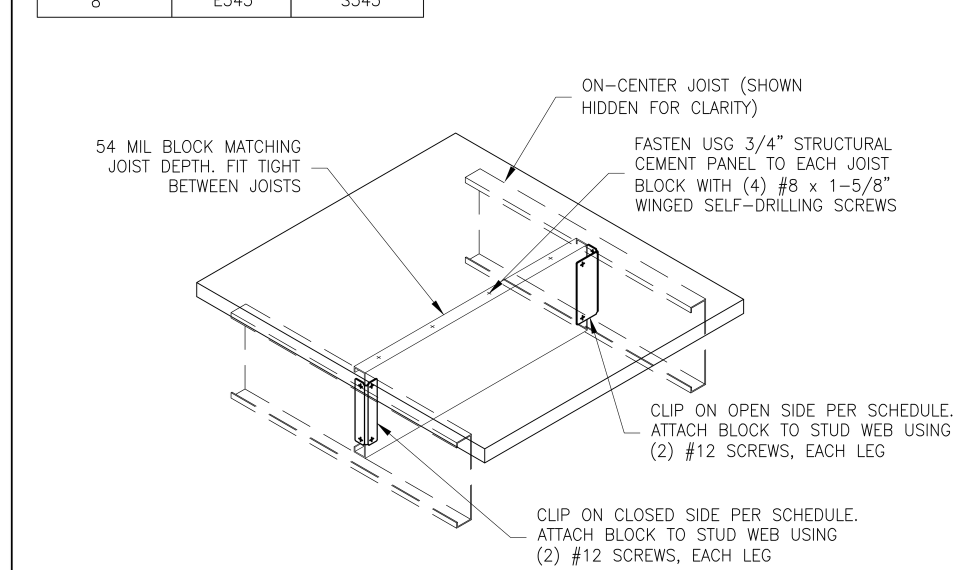
7 LSF JOIST BRIDGING
TYPICAL



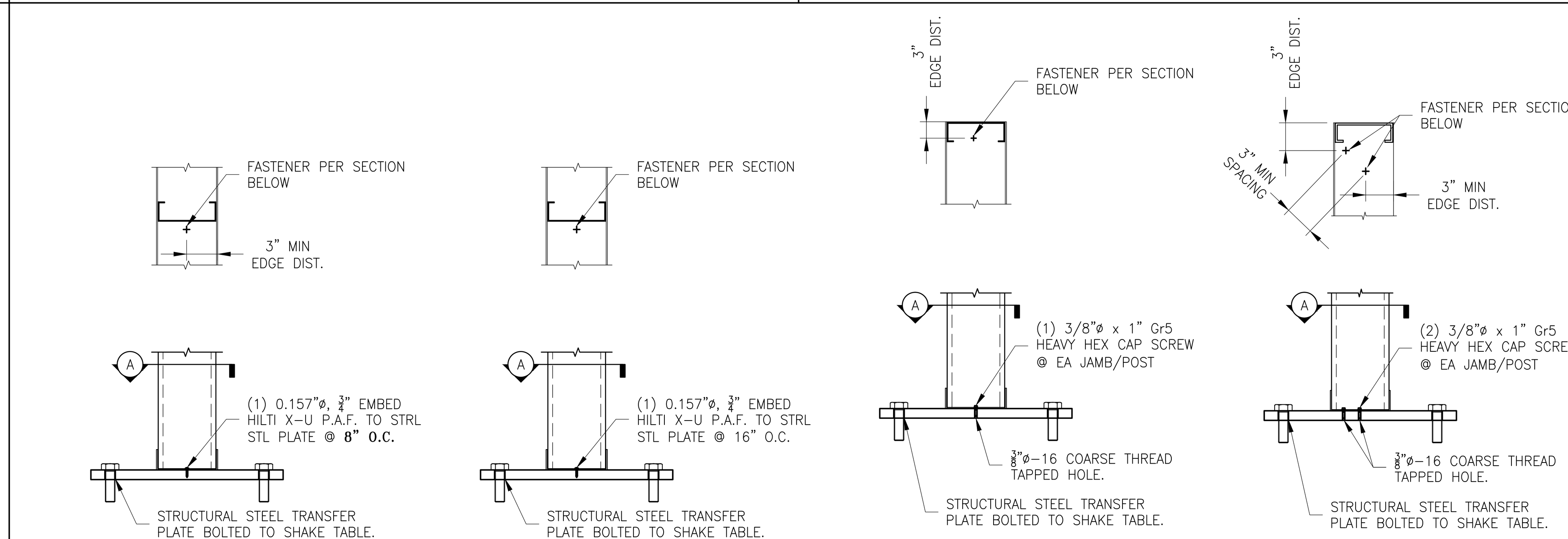
8 LADDER BLOCKING CONDITION
FLOOR END-JOIST PARALLEL TO OPEN EDGE

ClarkDietrich CLIP CONNECTOR

JOIST DEPTH	OPEN SIDE	CLOSED SIDE
12"	E549	S549
8"	E545	S545

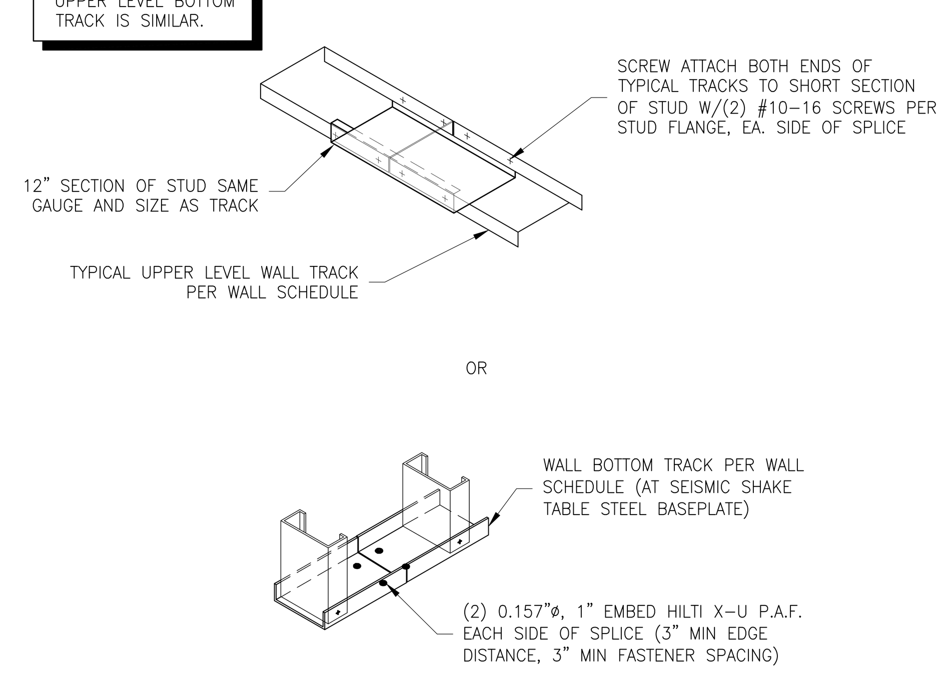


9 LSF JOIST BLOCKING
TYPICAL



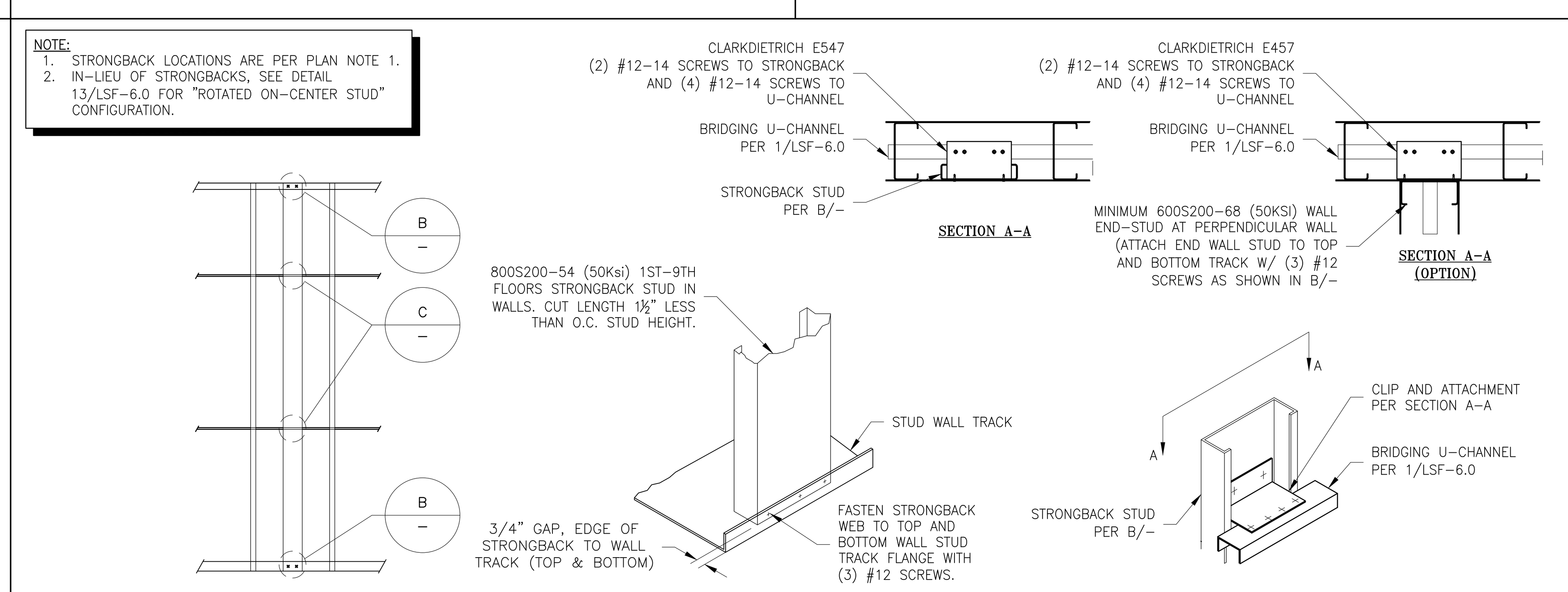
10 WALL BOTTOM TRACK CONNECTION @ TABLE

NOTE: TOP TRACK SHOWN, UPPER LEVEL BOTTOM TRACK IS SIMILAR.

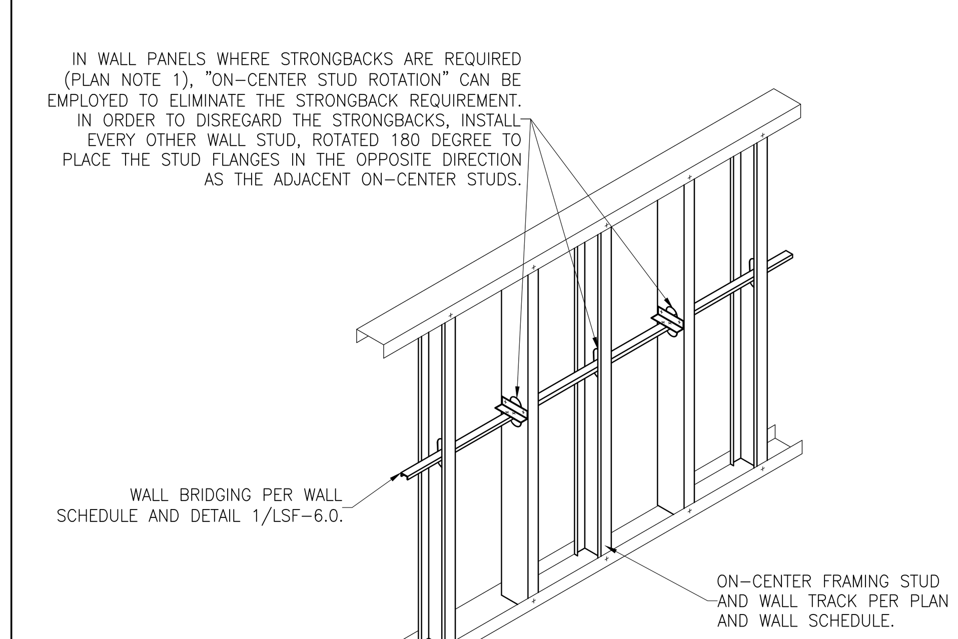


11 WALL TRACK SPLICE
NON-SHEARWALLS

NOTE:
1. STRONGBACK LOCATIONS ARE PER PLAN NOTE 1.
2. IN-LIEU OF STRONGBACKS, SEE DETAIL 13/LSF-6.0 FOR "ROTATED ON-CENTER STUD" CONFIGURATION.

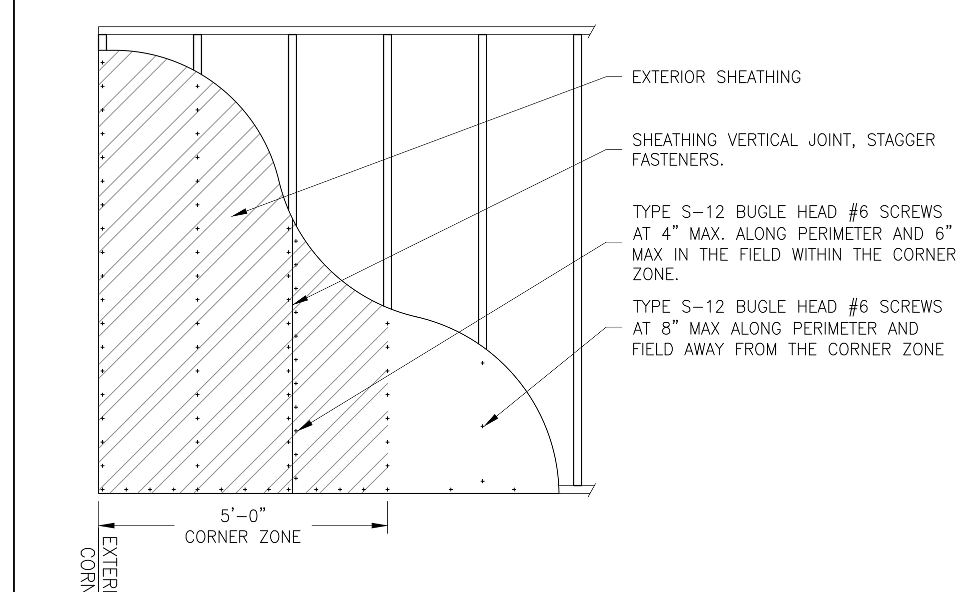


12 STRONGBACK WALL BRACING



13 ROTATED ON-CENTER STUD BRACING
IN-LIEU OF STRONGBACK BRACING
ASCE 04014043-1 Flexural Bracing Requirements in Axial Loaded CFS Framed Walls

NOTE:
1. 5/8" GYPSUM EXTERIOR GRADE SHEATHING IS THE BASIS OF DESIGN FOR EXTERIOR SHEATHING AND SPECIFIED FASTENER PATTERN. CDES TO BE CONTACTED IF ALTERNATE SHEATHING IS TO BE USED.
2. SHEATHING MAY BE APPLIED VERTICALLY (AS SHOWN) OR HORIZONTALLY.
3. GYPSUM SHEATHING IS NOT A NAILING SURFACE. CLADDING SYSTEM SHALL BE FASTENED THROUGH THE SHEATHING AND TO THE WALL STUD FRAMING.



14 TYPICAL EXTERIOR SHEATHING ATTACHMENT

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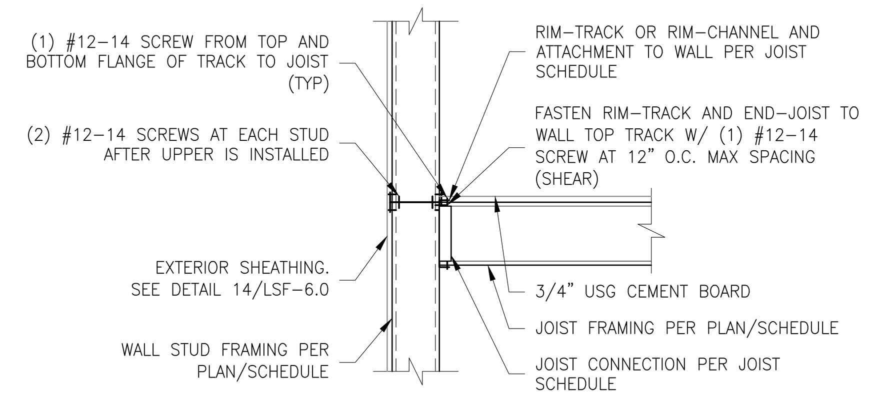
Date: 10/29/2021

Project Number: 2150200882-1

Sheet Title: FRAMING DETAILS

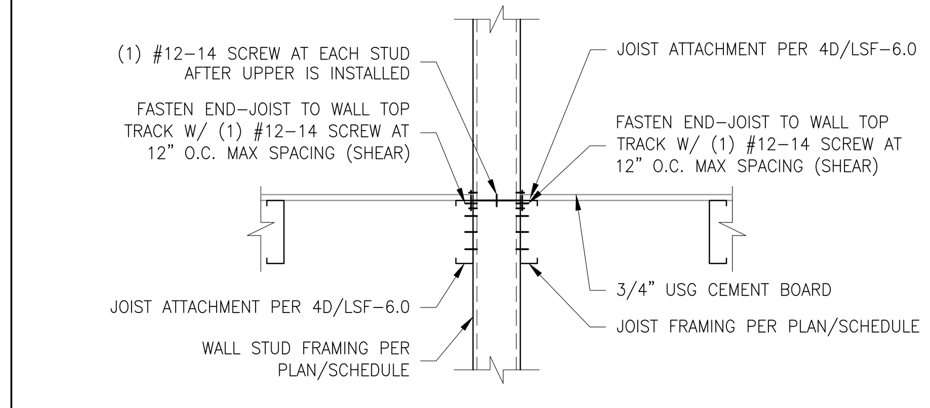
Sheet No. LSF-6.0

NOTE:
WHERE RIM-TRACK OR RIM-CHANNEL ACTS AS HEADER, ATTACHMENT TO JAMBS MUST BE PER WALL OPENING SCHEDULE.



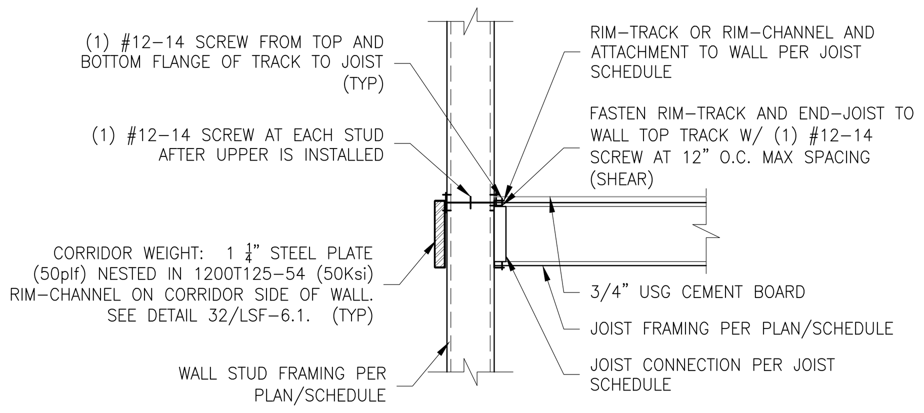
16 JB EXTERIOR WALL TRACK CONN.

NOTE:
WHERE RIM-TRACK OR RIM-CHANNEL ACTS AS HEADER, ATTACHMENT TO JAMBS MUST BE PER WALL OPENING SCHEDULE.



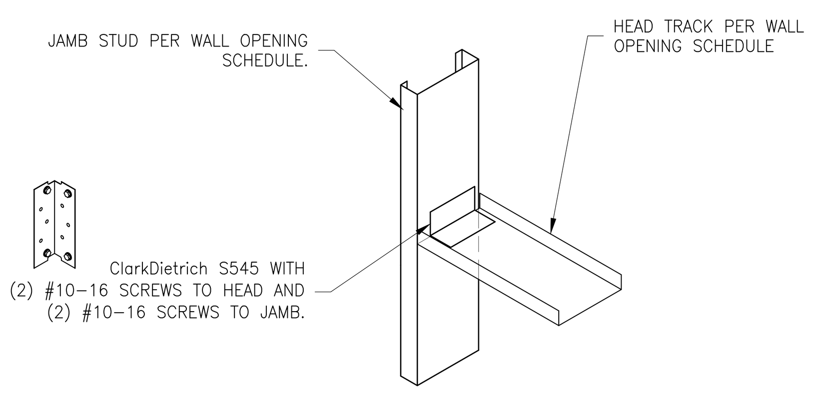
17 NJB INTERIOR WALL TRACK CONN.

NOTE:
WHERE RIM-TRACK OR RIM-CHANNEL ACTS AS HEADER, ATTACHMENT TO JAMBS MUST BE PER WALL OPENING SCHEDULE.

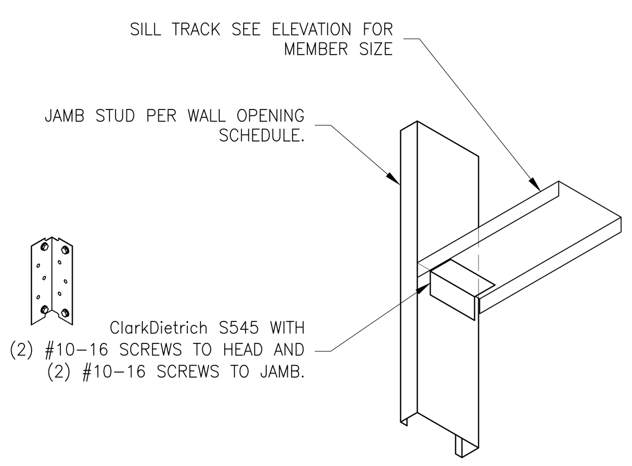


19 JB INTERIOR WALL TRACK CONN.

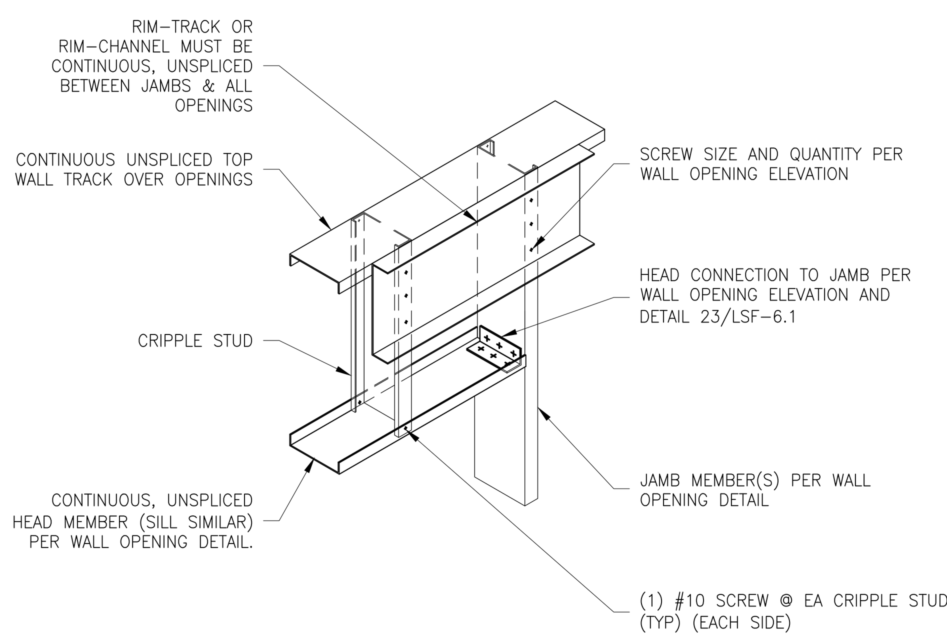
MAIN LANDING JOIST PER SCHEDULE/PLAN



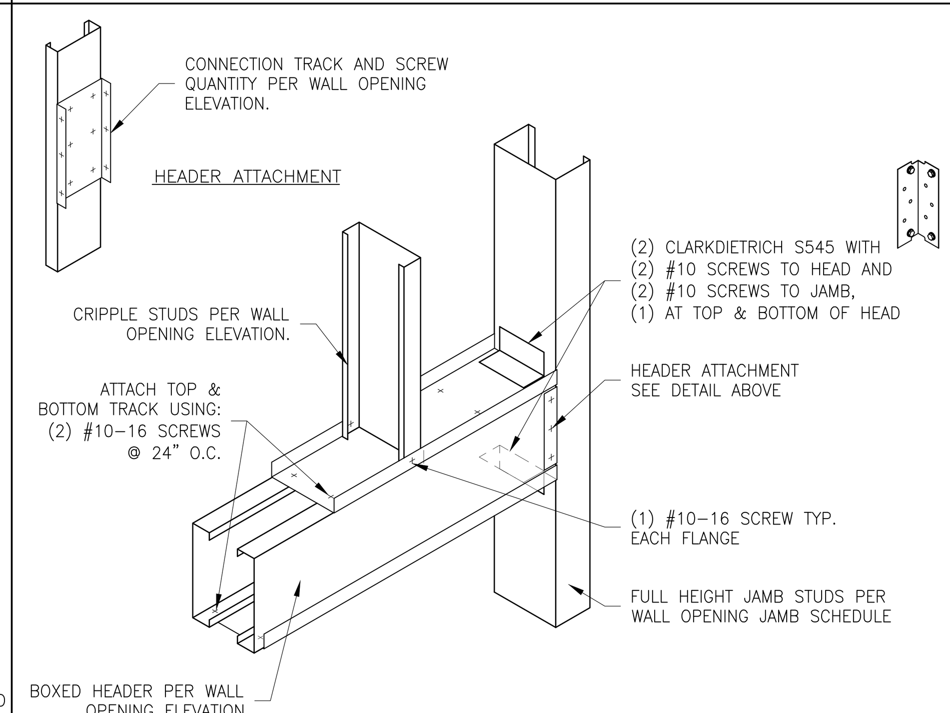
23 HEAD TRACK CONNECTION



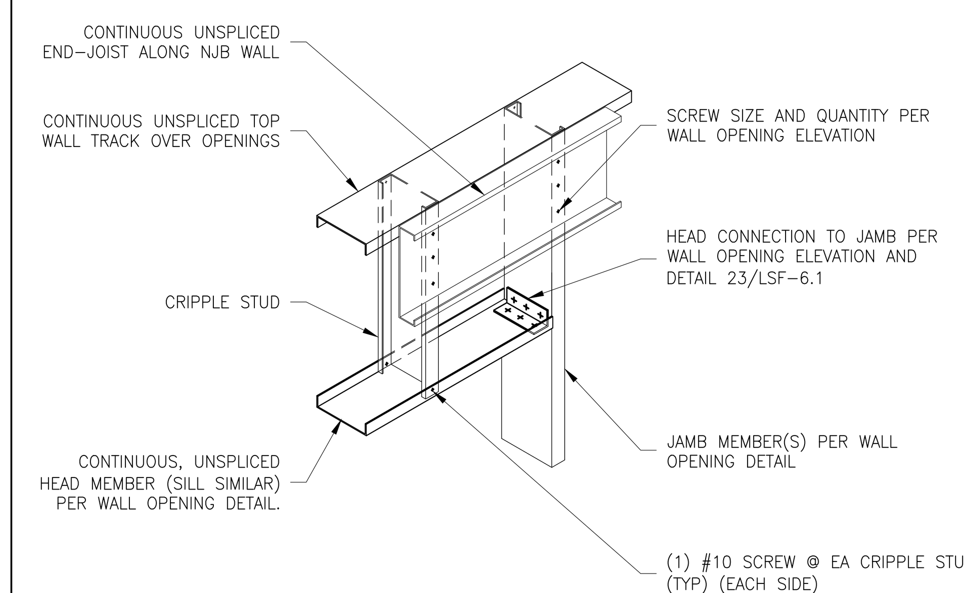
24 SILL TRACK CONNECTION



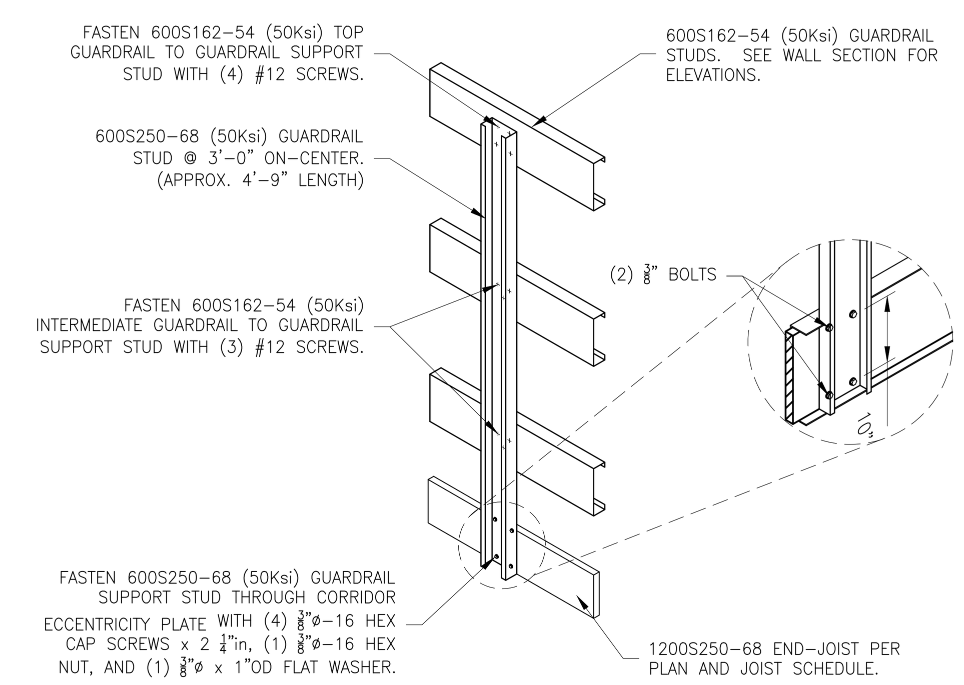
25 RIM-TRACK HEADER CONNECTIONS
JB OPENINGS



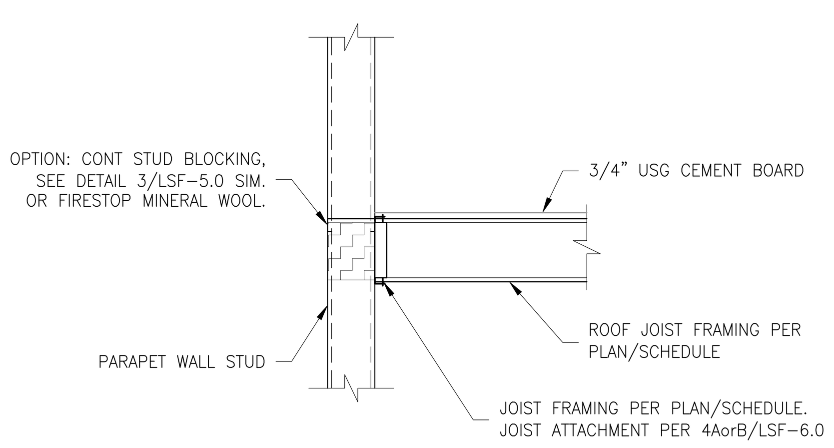
26 BOX HEADER CONNECTIONS



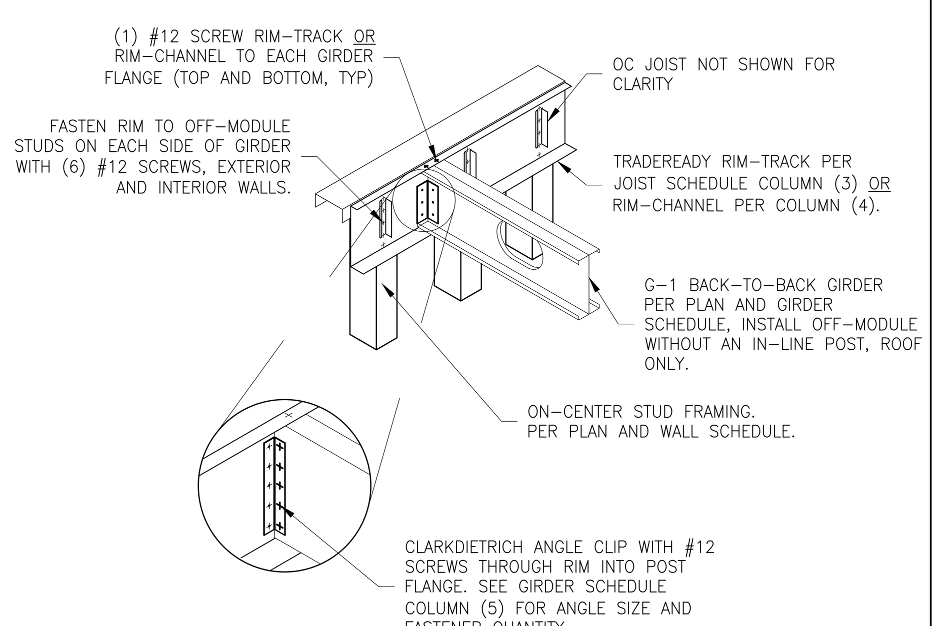
27 END-JOIST HEADER CONNECTIONS
NJB OPENINGS



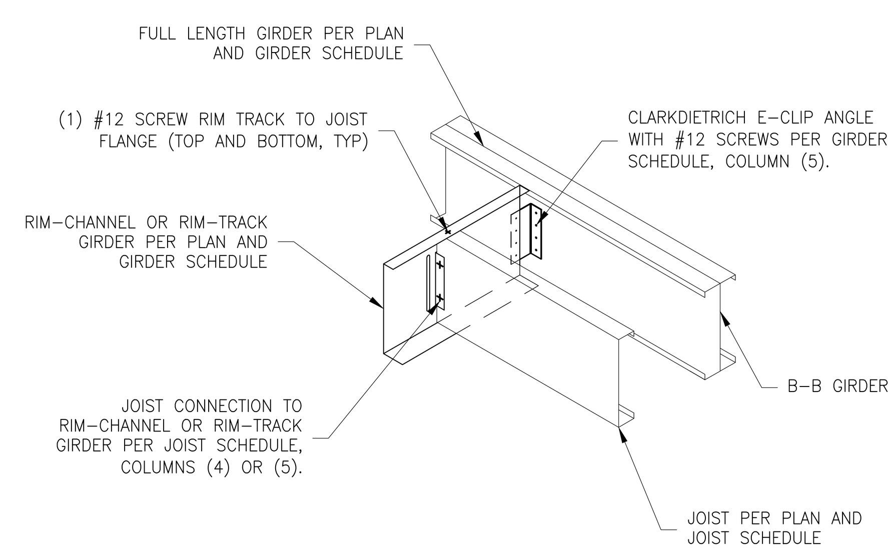
28 GUARDRAIL STUD CONNECTION
TEST PORTION @ CORRIDOR PLATE
1



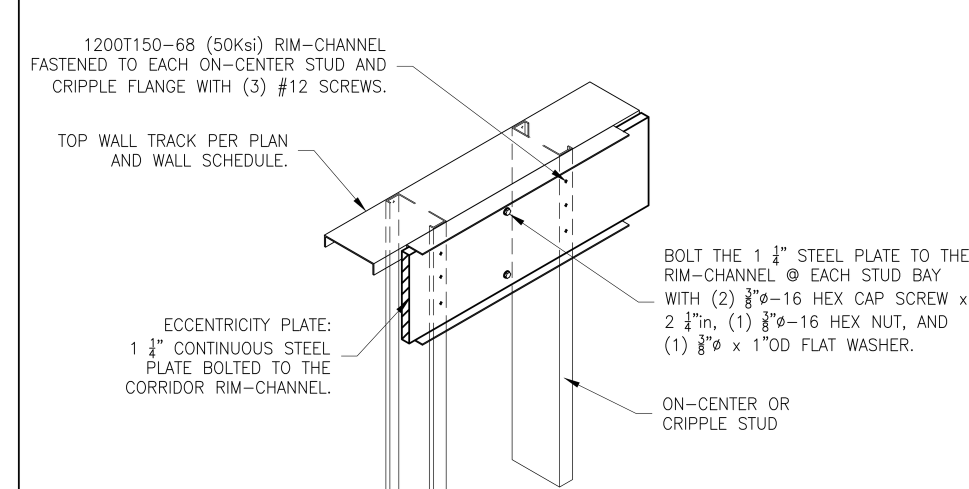
29 PARAPET WALL BLOCKING



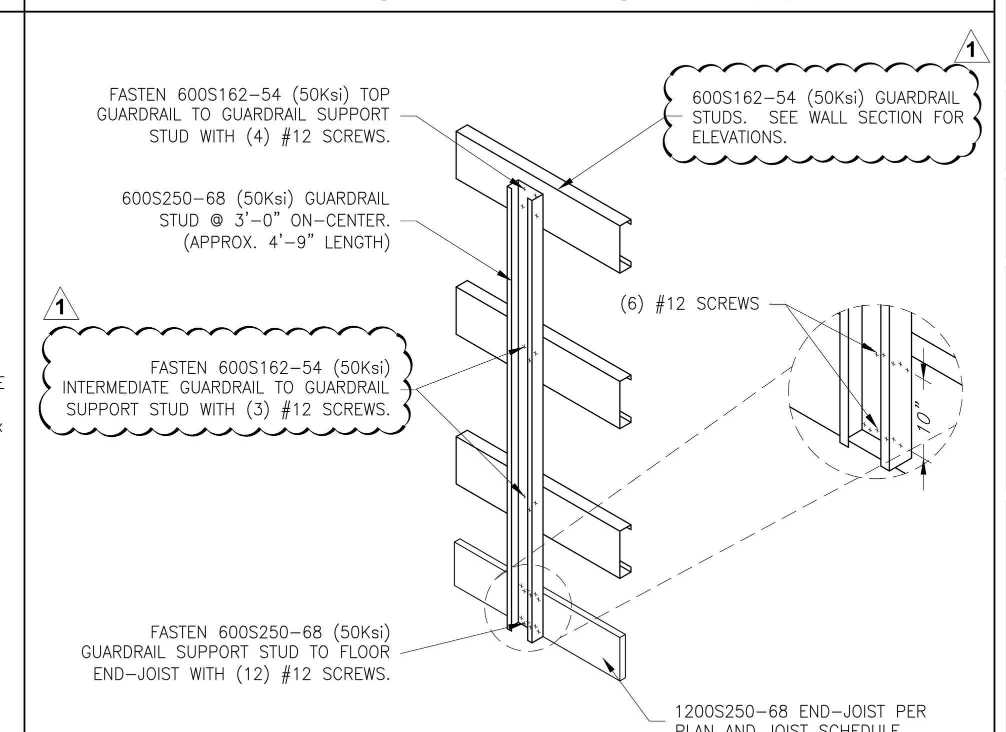
30 B-B GIRDER CONNECTION TO RIM
ANGLE CLIP AND WALL CONNECTION



31 RIM-GIRDER TO B-B GIRDER CONNECTION
RIM-TRACK OR RIM-CHANNEL



32 CORRIDOR 50 PLF ECCENTRICITY WEIGHT
TEST PORTION



33 GUARDRAIL STUD CONNECTION
TEST PORTION @ END-JOIST

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CFS-NHERI 10-Story Test Portion

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Revisions	
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Drawn:	Engineer:	Reviewed:

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Sheet No. LSF-6.1