

ENTRY FORM



DVASE 2020 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

Buildings under \$5M	<input checked="" type="checkbox"/>	Buildings Over \$100M	<input type="checkbox"/>
Buildings \$5M - \$15M	<input type="checkbox"/>	Other Structures Under \$1M	<input type="checkbox"/>
Buildings \$15M - \$40M	<input type="checkbox"/>	Other Structures Over \$1M	<input type="checkbox"/>
Buildings \$40M - \$100M	<input type="checkbox"/>	Single Family Home	<input type="checkbox"/>

Approximate construction cost of facility submitted:	~\$4.0M
Name of Project:	Undisclosed International Tech Company
Location of Project:	Cherry Hill, NJ 08002
Date construction was completed (M/Y):	March, 2020
Structural Design Firm:	Orndorf & Associates, Inc.
Affiliation:	All entries must be submitted by DVASE member firms or members.
Architect:	Neumann Smith Architecture
General Contractor:	Wolfe Scott Associates

Company Logo (insert .jpg in box below)



Important Notes:

- Please .pdf your completed entry form and email to bsagusti@barrhorstman.com.
- Please also email separately 2-3 of the best .jpg images of your project, for the slide presentation at the annual dinner and for the DVASE website. Include a brief (approx. 4 sentences) summary of the project for the DVASE Awards Presentation with this separate email.

- Provide a concise project description in the following box (one page maximum). Include the significant aspects of the project and their relationship to the judging criteria.

The project involves the required shell work for a 'flag ship' retail space for an undisclosed international tech giant's. Orndorf & Associates (O&A) served as the engineer of record to perform the structural design and building renovations to accommodate the tenant's intended design of this new flag ship store.

O&A was initially tasked with providing an in depth feasibility study in order to review the the possibility of removing 8 interior columns (in a row) at a local shopping mall, raising the existing roof elevation, while maintaining 'business as usual' activity at all other tenant spaces and mall common areas. O&A provided two schemes for achieving this work, with sufficient design and documentation detail for preliminary budgeting.

The final intent of the design required a wide open, columnless tenant space, with higher roof elevation, a very high ceiling elevation (minimal depth was provided for the structure - all MEP had to be within the depth of the roof framing members), a seemingly floating thin shell roof/canopy structure, supported on two sides on full-height, uninterrupted glass storefronts. As the DD and CD phases of the project got underway, numerous changes by the tenant's design team (changes were happening through the bidding phase) introduced structural challenges and re-designs to allow their vision to be achieved.

The existing mall roof framing at the tenant spaces are open web steel bar joists (40 ft span) supported by a continuous overhang beam system. The columns are bearing on caisson foundations. By removing eight (8) columns in the middle of the future combined tenant space, the new roof beams needed to span 74 ft and be supported by the existing columns and foundations. The new roof at these areas is raised to two different new and higher elevations. O&A worked with the land lord architect to ensure that the adjacent remain unaffected even when large areas of their common roof framing had to be reconfigured.

The structural design plays key role through feasibility study to final construction to keep the project going. It has gone through all kinds design challenges through all phases and come up to the final completion of the construction with goal reaching, cost saving and construction on schedule. This renovation project reveals the beauty of sophisticated structural design for the success of a project facing the challenges of complicated existing conditions, cost saving and construction schedule.

The first major challenge was the foundation system. Deep foundations were required due to the poor soil condition. However, caissons to match the existing foundation are not realistic in this busy commercial area since the mall activities are not allowed to be affected by heavy construction. All existing columns are reinforced to utilize the full capacity of the existing foundation for the additional loads. New columns are added at the sides of the tenant space to compensate for remaining new induced loads. Groups of helical piles are designed to support the new columns. The location of the new columns are optimized by re-arranging the roof framing and fully utilizing the capacity of the existing column and foundation system.

The second major challenge is the modification for new and existing roof connections. All new structural modifications are limited inside of the lease lines. Existing beams and columns along and outside of the lease lines remain to support the roof framing at the adjacent tenant spaces. New roof beams are supported on the existing beams over the existing joist seats for the new higher roof. Over 18 joists are cut in the middle of their span and new joist seats are formed on the support beams.

The third major challenge is the storefront framing. The existing roof beam in the leased space needed to be cut and replaced with a new and deeper roof beam at higher elevation. This 60ft long new roof beam also supports an existing major gravity column for the mall common area high roof; the existing column's lower portion was cut and removed. The long span beams have to be brought in by two pieces and spliced in field. The contractor was instructed to pre-load the storefront beam to account for the deflection caused by the post-up high mall. In fact due to the non-existing ceiling cavity (ceiling is at bottom of structure), and intended ceiling architectural design, limiting deflections for long spans was one of the biggest challenges of the job. Special steel design and detailing of the beam web openings was also required as the special wood left no space for HVAC ducts. The west end of the storefront beam continues over an existing column to pick up the load from another existing high roof post-up column on the existing beam. The restrict requirements from the tenant design put a lot of challenge on the structural design. The 60ft long storefront beam was required to limit the live load deflection to 0.2 inches! Six (6) pivot doors are installed to the 50ft long door opening at the storefront, which required special attention to the bracing elements.

The 75ft long exterior glazing walls around the corner are pushed out of column line by 8 ft and braced by the 13 ft long tapered canopy at top. The backup steel beam supporting the canopy is designed to limit the deflection of live load to 0.2 inches as well. Special continuous framing connections achieve this minimal deflection and provide a seemingly thin shell canopy that appears to be floating above the exterior glazing. The two round tube columns behind the glazing wall are required to be stainless steel with special finish. The structural design overcomes these challenge by redistributing the loads with proper framing arrangement and beam sizing.

The structural design of this job was the dominant part of the overall design process for the land lord design team. O&A was able to provide the required stringent tenant requirements in a manner that minimized the land lord work and hence reduced the overall cost in a substantial manner.

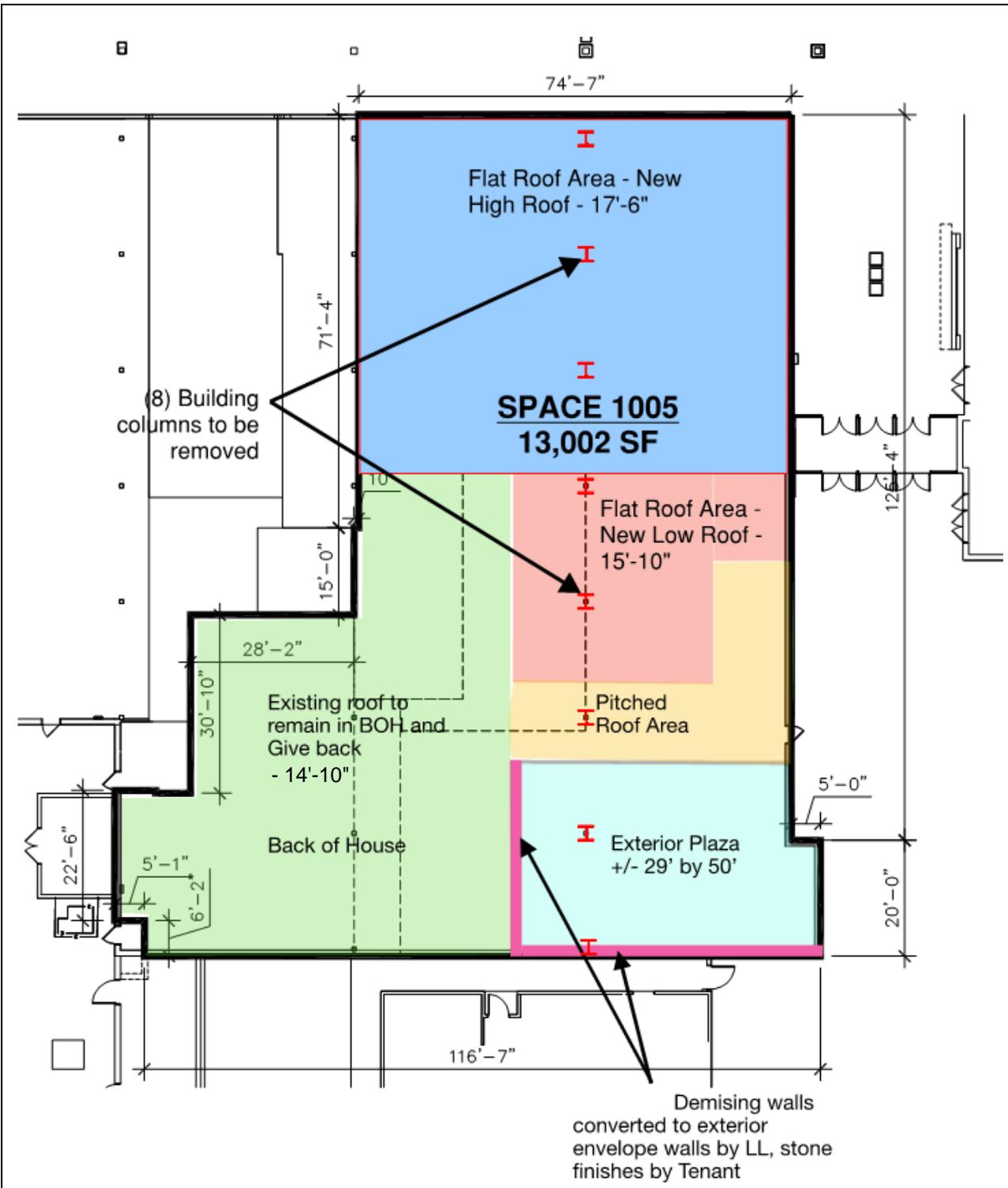
- The following 5 pages (maximum) can be used to portray your project to the awards committee through photos, renderings, sketches, plans, etc...



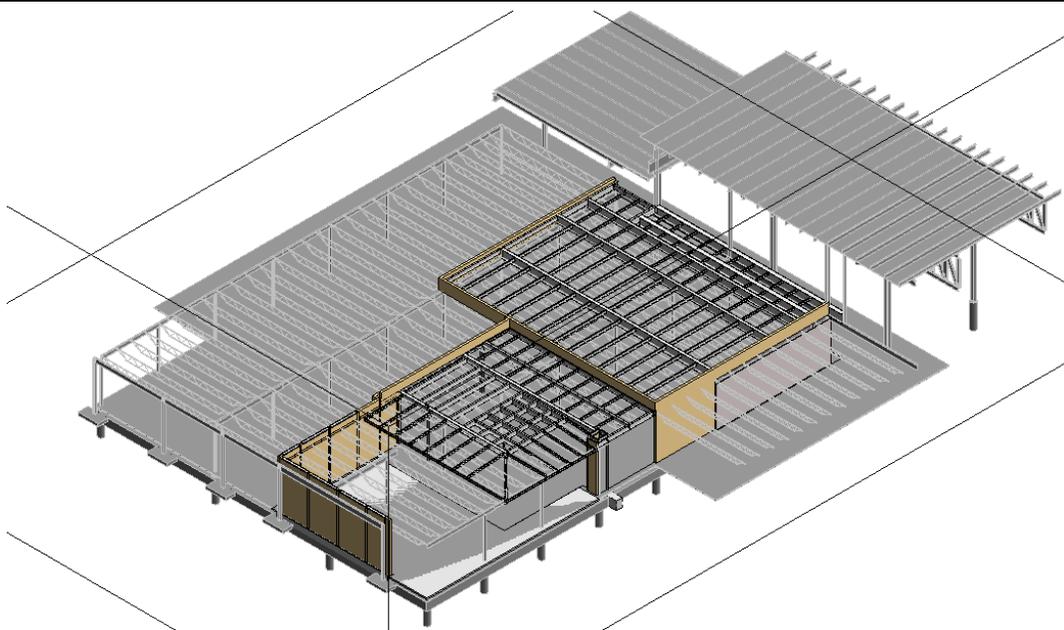
Store Front View (inside Mall)



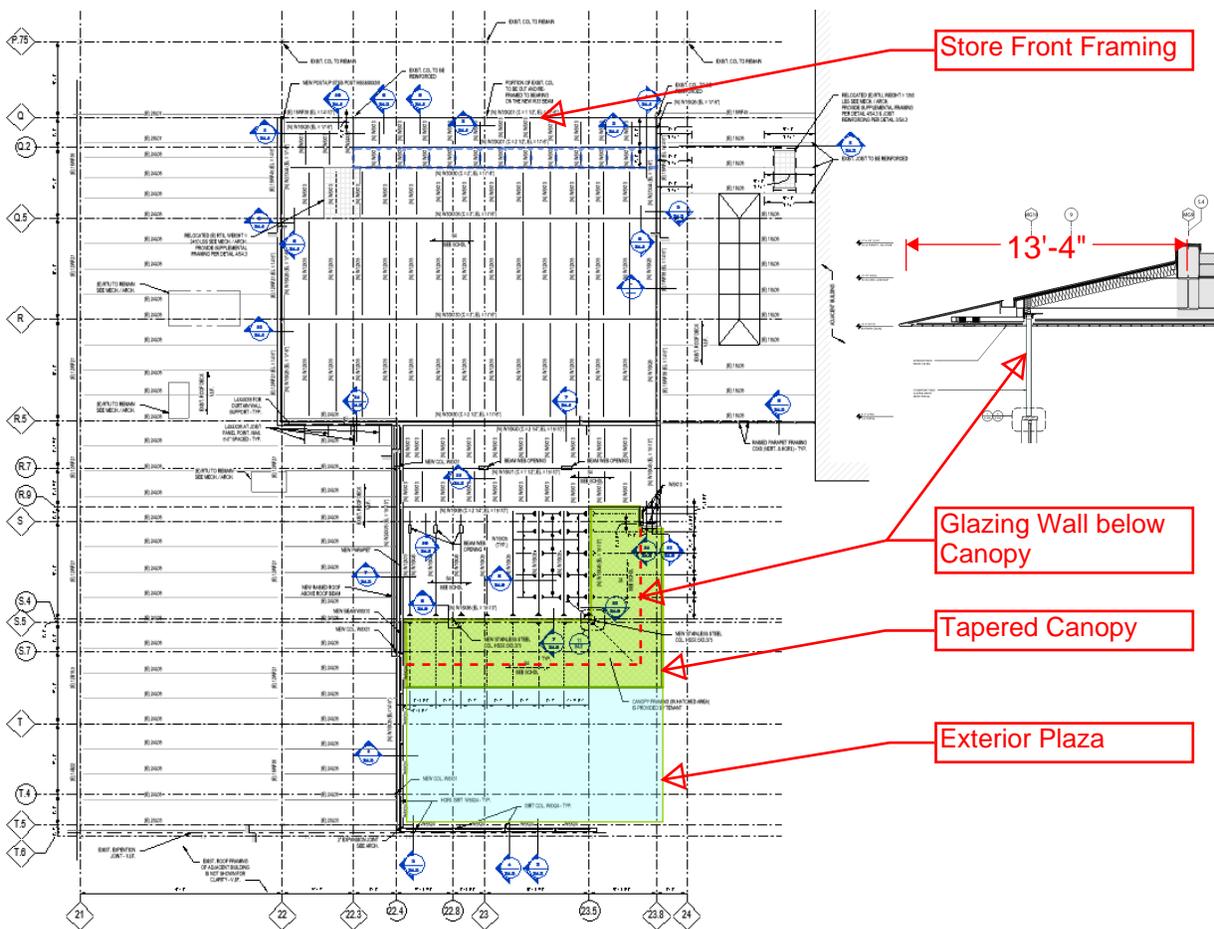
Store Rear View (outside Mall)



Roof Variation of the Tenant Space



3D Model



Roof Framing Plan

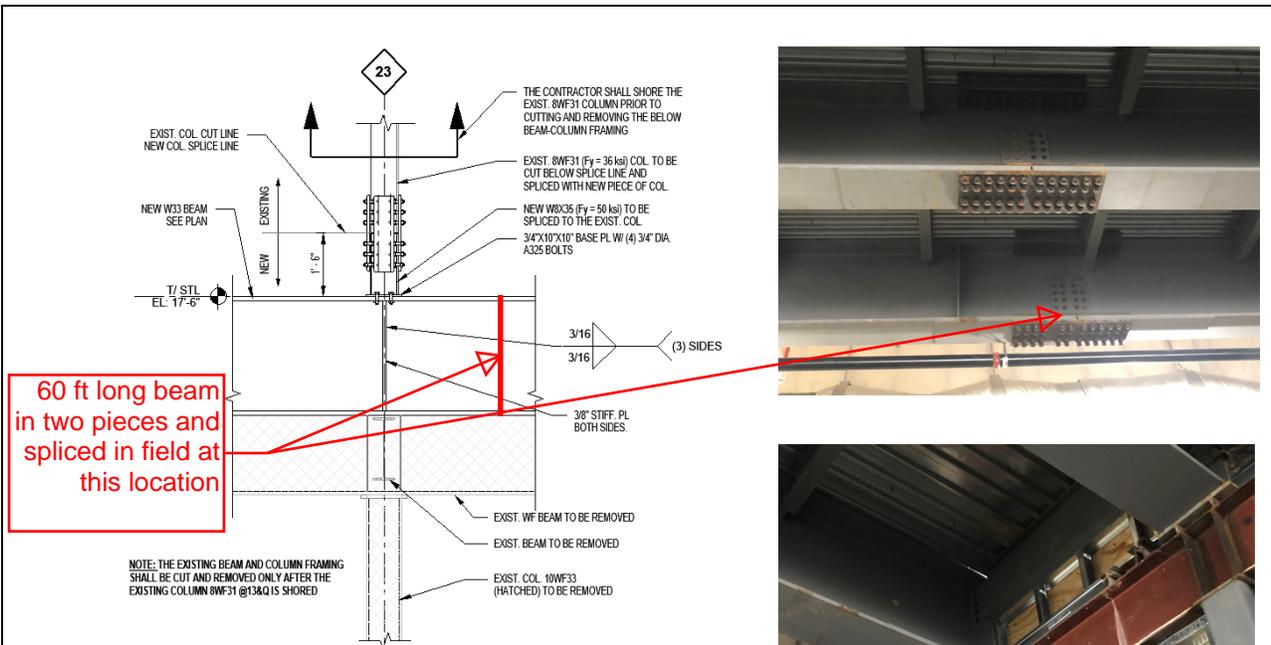
Store Front Framing

Glazing Wall below Canopy

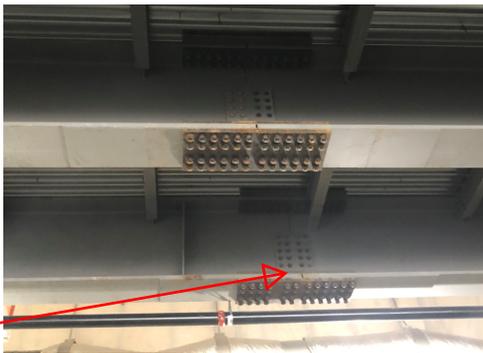
Tapered Canopy

Exterior Plaza

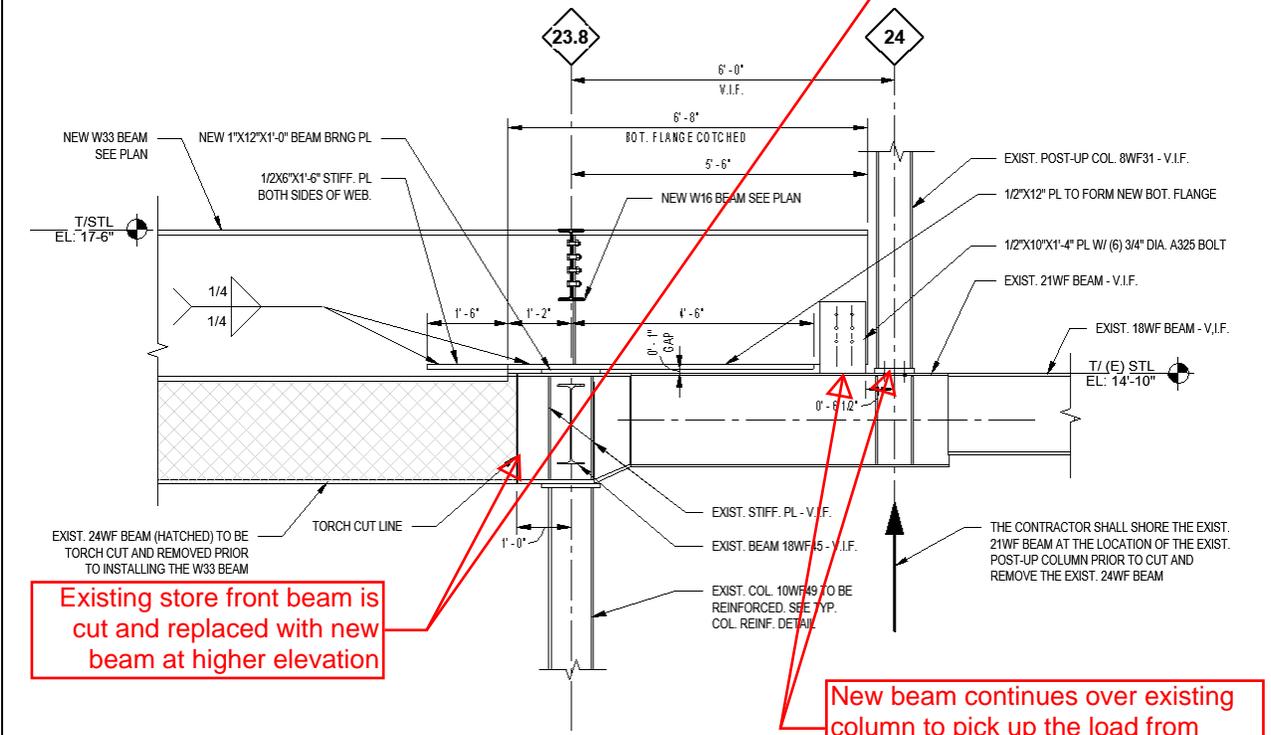
13'-4"



60 ft long beam
in two pieces and
spliced in field at
this location



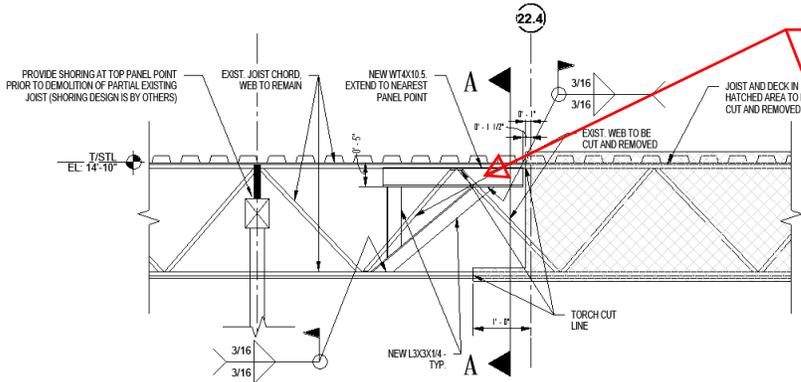
2 NEW BEAM TO SUPPORT EXIST. COL. AT LINE Q
S4.1 1/2" = 1'-0"



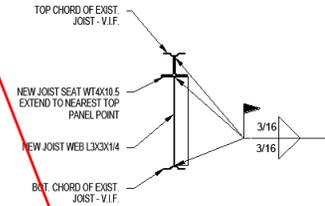
Existing store front beam is
cut and replaced with new
beam at higher elevation

New beam continues over existing
column to pick up the load from
existing post-up column

3 BEAM CONNECTION ALONG LINE Q
S4.1 1/2" = 1'-0"



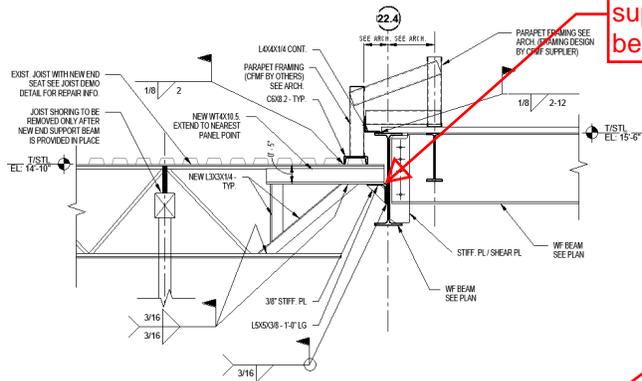
Existing joist is cut and new bearing seat is formed



SECTION A-A

DETAIL OF EXIST. JOIST DEMO / NEW SEAT FORMING BTWN LINE R.5 AND S.7

1
S4.2
3/4" = 1'-0"



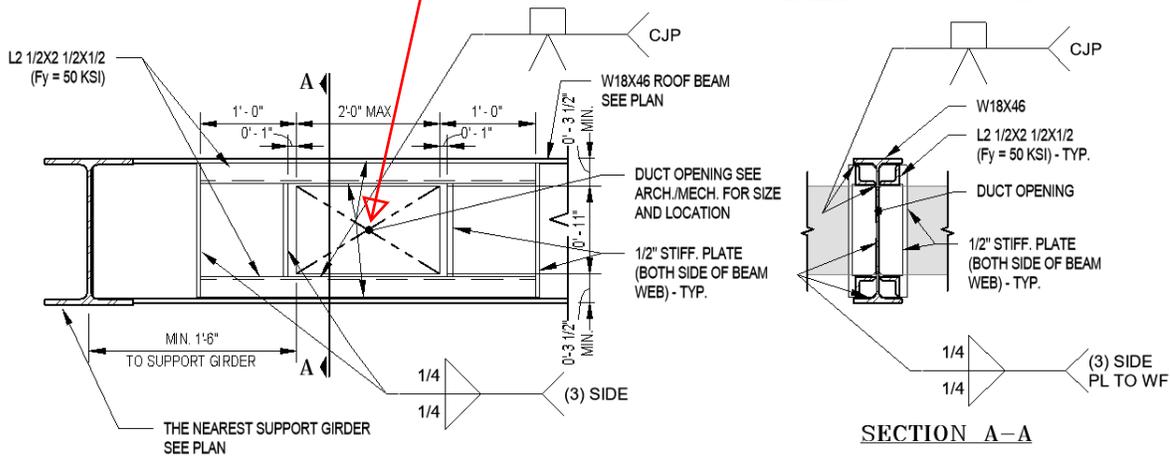
Existing joist is cut and supported by new roof beam



SECTION THRU NEW TO EXIST. ROOF

7
S4.2
3/4" = 1'-0"

Beam web opening for duct work



SECTION A-A

BEAM WEB OPENING DETAIL

10
S4.2
3/4" = 1'-0"

By signing, signatory agrees to the following and represents that he or she is authorized to sign for the structural design firm of record.

All entries become the property of DVASE and will not be returned. By entering, the entrant grants a royalty-free license to DVASE to use any copyrighted material submitted.

If selected as an award winner, you may be offered the opportunity to present your project at a DVASE breakfast seminar. Would you be willing to present to your colleagues? **YES** **NO**

Submitted by:

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