

## Mechanical Breadth

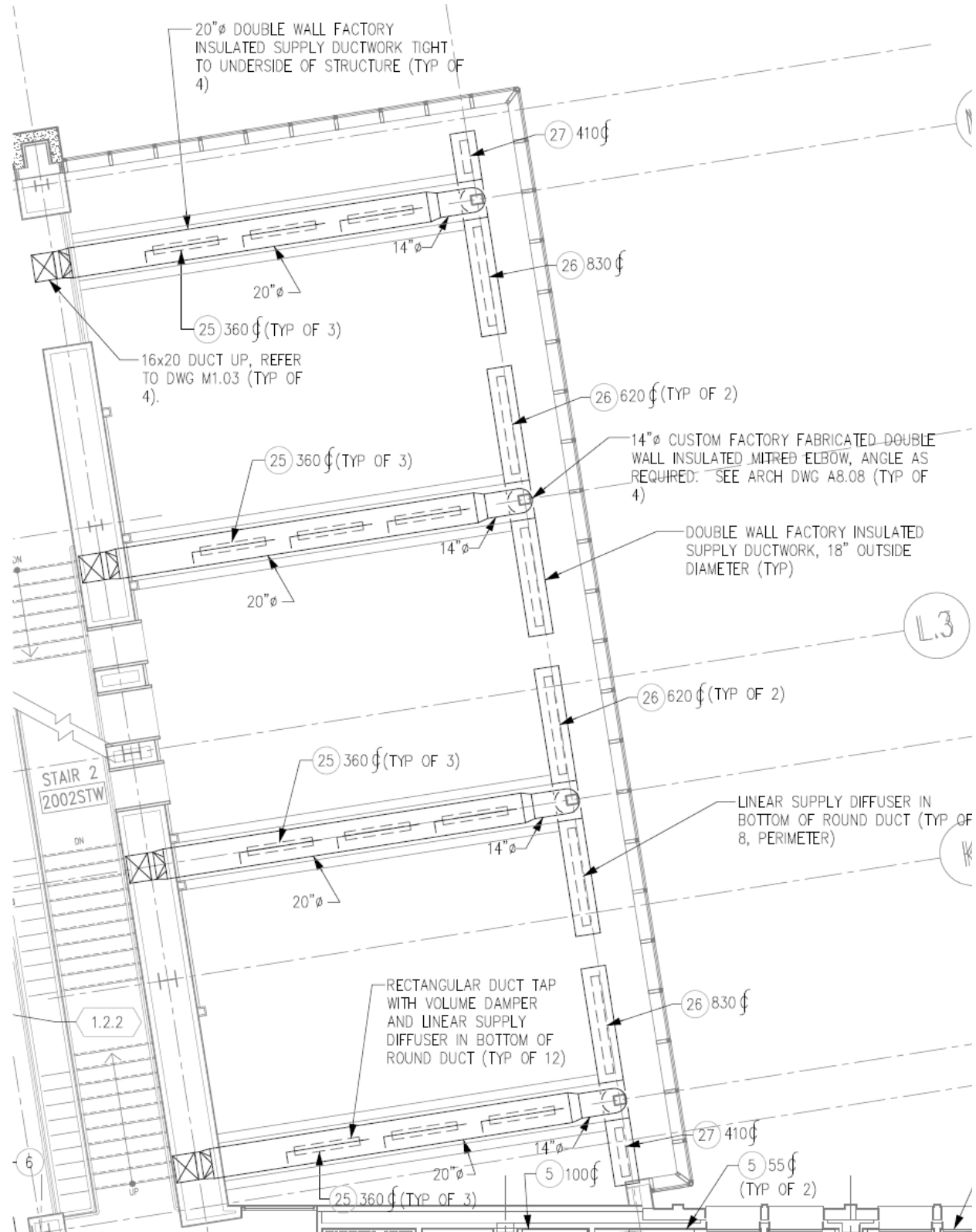
### Introduction

As part of my proposed lighting design for the Café DUSON, my design intent is to integrate most of the lighting into the architecture and to visually clean up the space. The existing lighting design utilizes 24 compact fluorescent pendant fixtures as the main lighting source within the café. In order to maintain the proper level of illumination on the workplane and remove these 24 pendants, lighting needs to be integrated into the four wooden roof beams.



The previously mentioned wooden roof beams are actually two 24-in tall by 6-3/4-in wide individual beams spaced 24-in apart from each other. The existing mechanical design has a 20-in diameter double wall insulated round supply duct running between each of these coupled beam systems. These 20-in round supply ducts then transition into a 14-in diameter round duct that runs perpendicular to the 20-in round ducts and parallel to the large glass curtain wall. Please refer to the following existing mechanical plan for more information.

Existing Mechanical Plan



### **Proposed Mechanical Change**

The proposed mechanical modification is to change the existing double wall insulated 20-in round ducts to 20-in by 16-in double wall insulated rectangular ducts. The design intention for changing the round ducts to rectangular ducts is to decrease the height of the ducts within the beam space. As part of my lighting redesign I am placing 6-in high ceramic metal halide downlights with an aperture of 11-in. If I were to place these downlights within the beam space with the 20-in round ducts, I would exceed the 24-in beam space height by 2-in. However, by changing the round ducts to 20-in by 16-in rectangular 1-in insulated double wall ducts I gain the necessary 2-in to fully enclose the beam space with a wood panel and recess the 6-in high downlights.

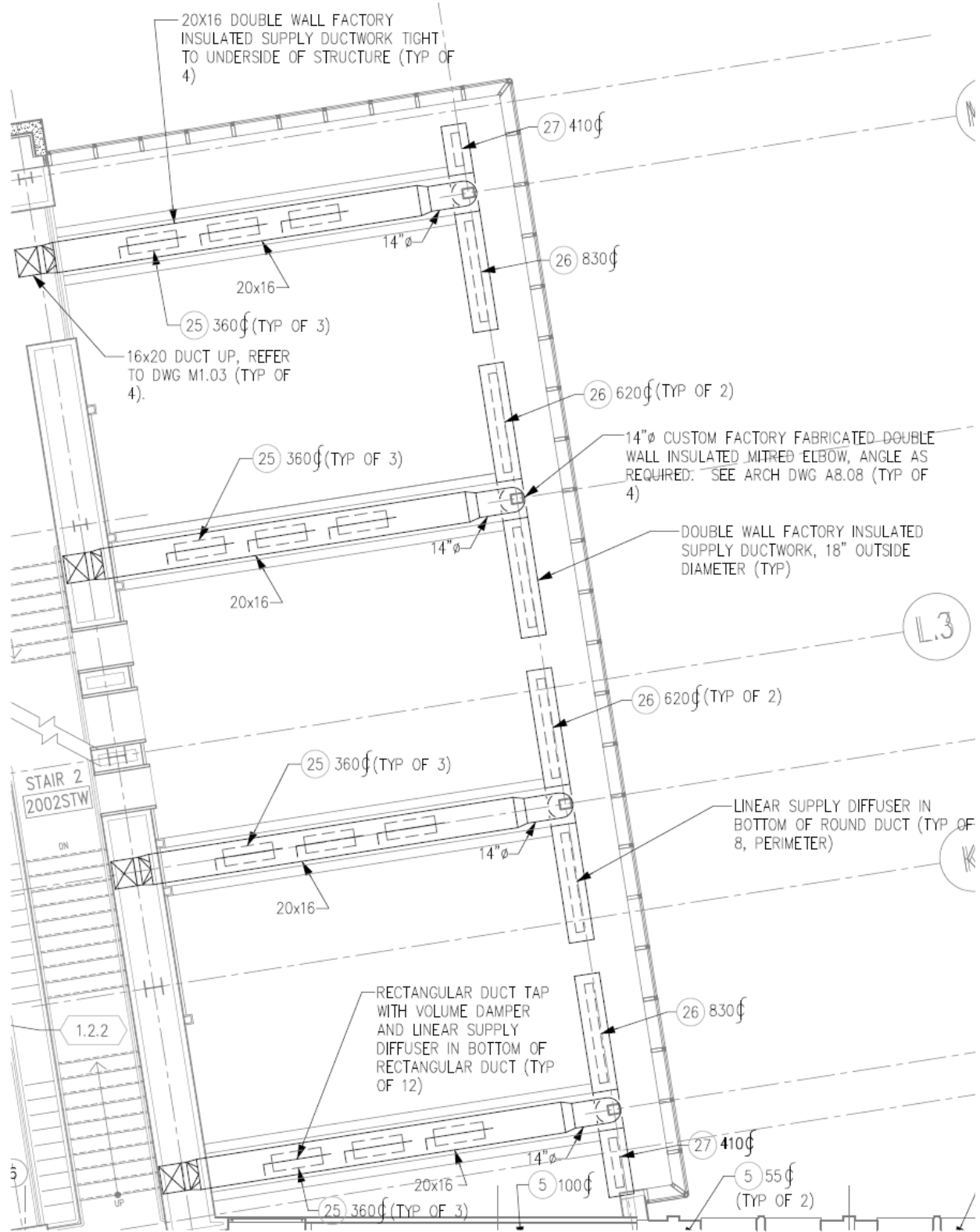
A problem that arises visually by enclosing the beam space is that the relatively thin looking individual beams now become solid thick looking beams. Considering the other wooden timber in the space, the scale of the enclosed beams looks out of place. In order to avoid this scale issue and to still enclose the beam space, I am proposing that the height of the beams be changed from 24-in to 26-1/2-in. This additional height will allow for all the mechanical and lighting equipment to be enclosed as well as maintain the scale of the beams with the other wood in the space.

I am also proposing that the mechanical slot air diffusers be changed to accommodate the light layout as well as match the scale of the downlights. The existing linear slot diffusers, Titus Model CT-480, are 48-in long by 4-in wide. The proposed linear slot diffusers, Titus Model ML-38, are instead 36-in long by 12-in wide. Since the downlights are spaced every 42-in the existing diffusers would not fit between the lights. By decreasing the length of the diffusers, the width increases to 12-in. This increase in width actually works out visual, since the downlights are 11-in in diameter.

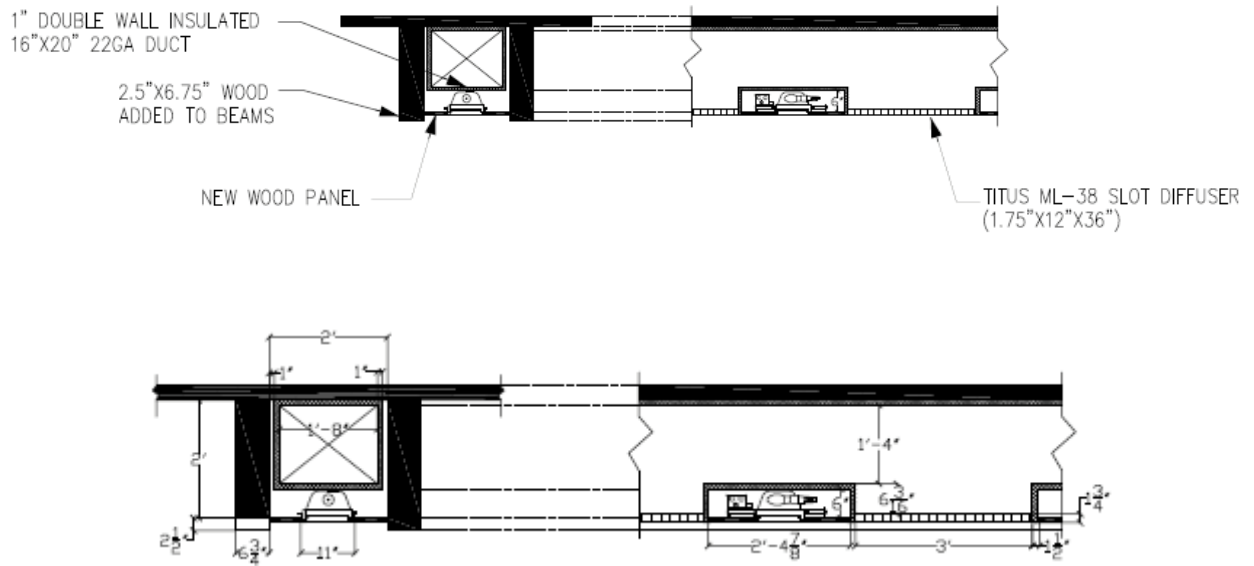
The proposed diffuser will have 8-slots, each 3/4-in wide and provide the scheduled 360 cfm at an acceptable NC value of NC-20. An advantage of using this type of diffuser is that the slots allow you to have vertical and horizontal discharge. By having both vertical and horizontal air discharges the throw area of the diffuser increases. The existing 4-in diffusers do not have both the vertical and horizontal discharge and does not offer as wide of a throw area as the proposed diffuser.

Please refer to the following plans and detail for more detail of the proposed mechanical and lighting integration.

Proposed Mechanical Plan



### Mechanical and Lighting Integration Detail



**Note:** Larger drawings can be found in Appendix B along with relevant cut sheets

### Mechanical and Lighting Coordination Plan



### Mechanical Cost Estimate

Mechanical Cost Estimate							
Duct Description	Gauge		Linear Ft (L.F.)		Cost/L.F.		Total Cost
Existing 22GA, 20" Dia. Round Factory Installed Double Wall Insulated Duct	24ga		22		\$27.70		\$609.40
Duct Description	Sum-Two-Sides	Gauge	Linear Ft	Wt-Lbs/lf	Wt-Lbs	Cost/Lbs	Total Cost
Proposed 22GA, 20"x16" Factory Installed 1" Double Wall Insulated Duct	36	22ga	22	9	198	\$7.31	\$1,447.38
<b>Total Mechanical Cost Difference</b>							<b>(\$837.98)</b>

\*All unit cost values obtained from 2008 RS Means

### Conclusion

The proposed mechanical change will cost an additional \$838, as compared to the existing mechanical system. This cost estimate assumes that the diffuser changes are equivalent in price, since no pricing information could be obtained for these two products. Also, this estimate is not including the additional wood that was proposed for the entire integration of the lighting and mechanical systems in the café. Even though this change from a round to rectangular duct cost a more, it is justifiable to say that this additional cost is worth it to make the space look better and potentially function better with the better diffusers.