## **Civil Engineering History: Relevant Successes and Failures** A Comparison of Structural Design Aspects of Rana Plaza and the Philadelphia City Hall

#### BACKGROUND

Rana Plaza was a garment factory bui in Bangladesh, and Philadelphia City F a municipal building in the United State Rana Plaza's collapse, due to a cracke corner column from a water heater explosion on the eighth floor, caused 1 deaths and 2515 trapped workers insid

# Hall

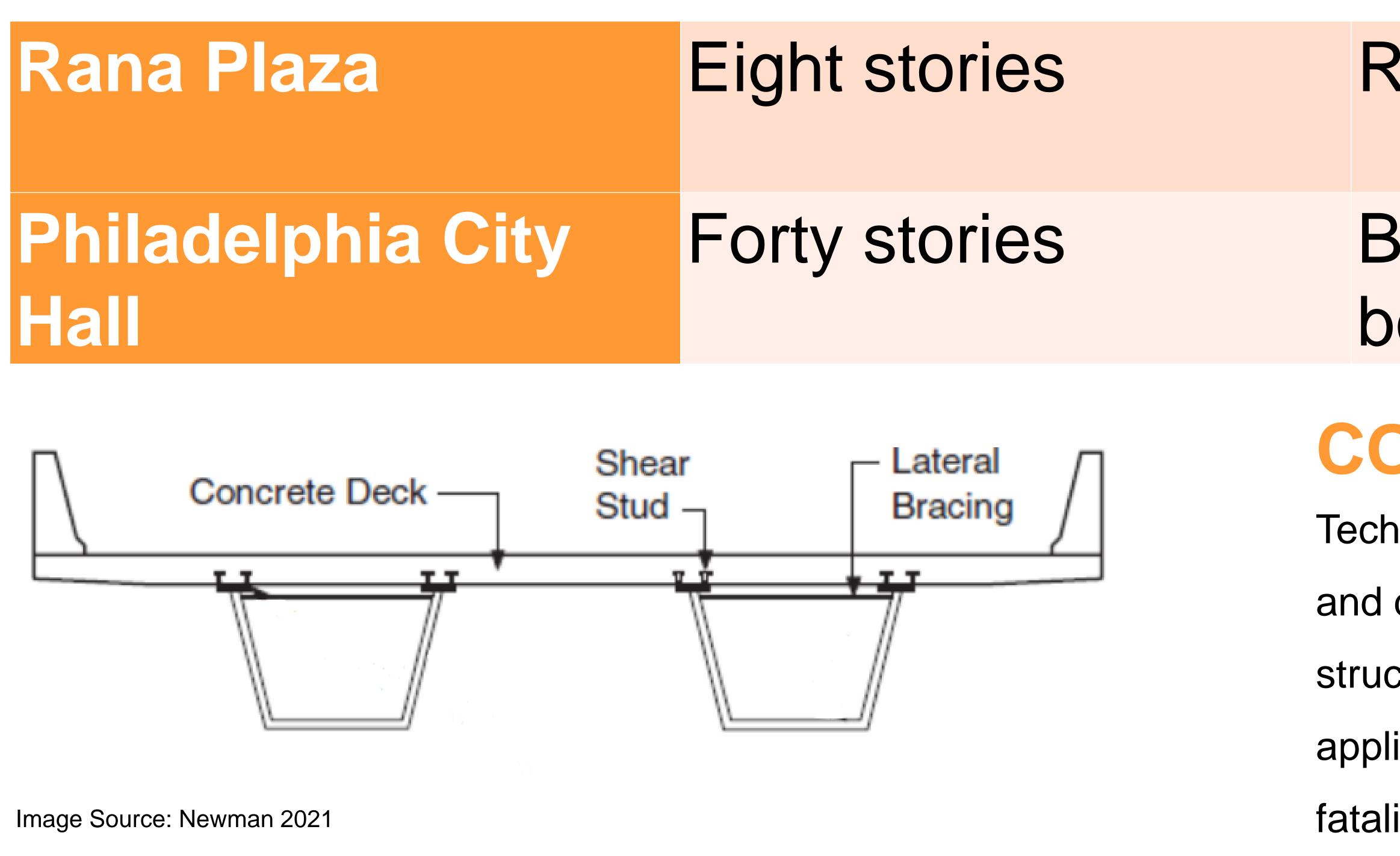


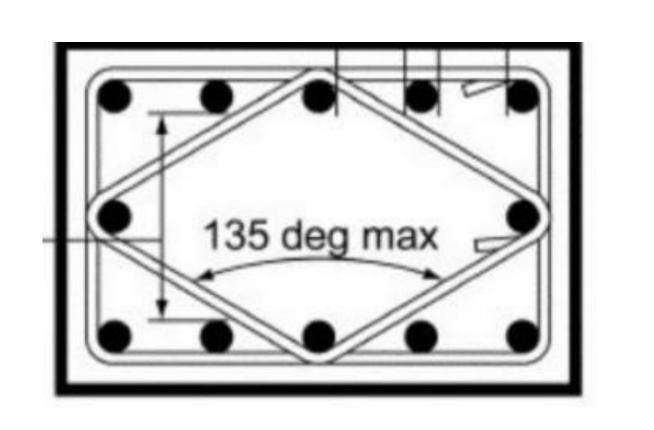
Image Source: Newman 2021

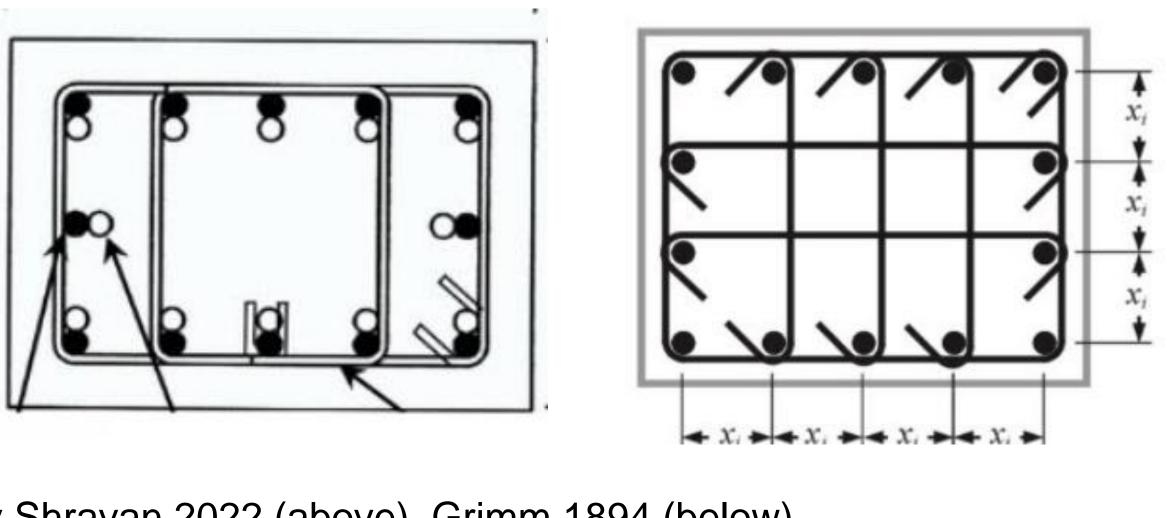


#### EVIDENCE

ilding	Rana Plaza:
Hall is	<ul> <li>columns, floors, and foundatio</li> </ul>
tes.	had concrete poured in-situ
ed	<ul> <li>no protection from external loa</li> </ul>
	Philadelphia City Hall:
1129	<ul> <li>lateral movement was allowed</li> </ul>
ide.	column attachment and reinfo
	iron frame

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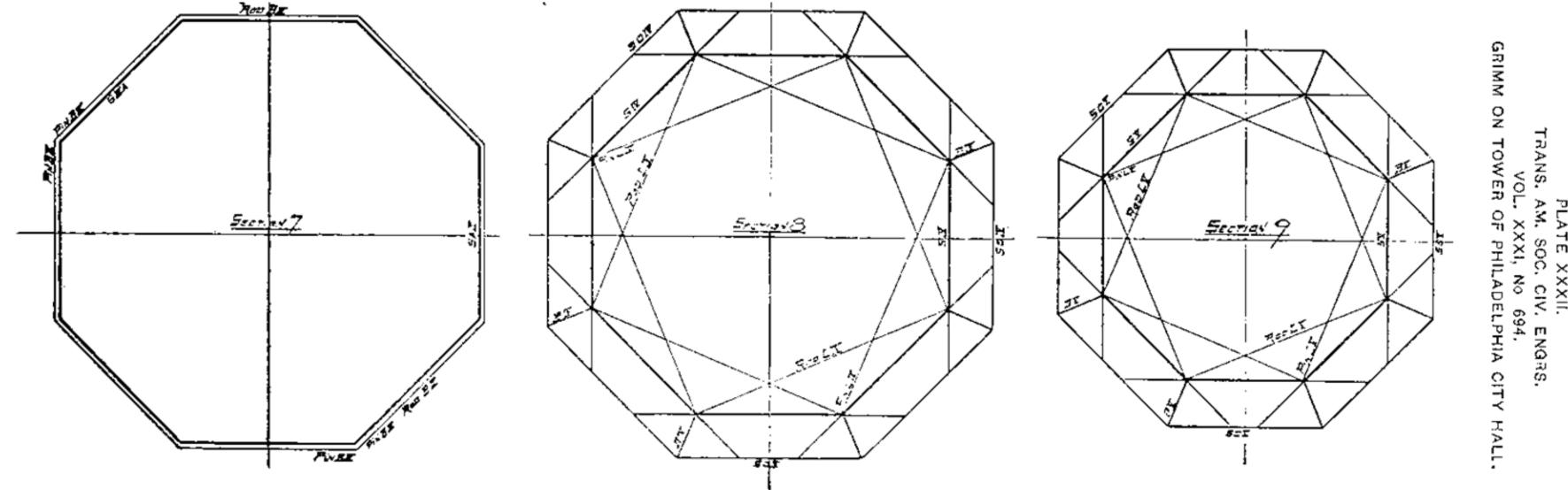


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Image Source: Civil Engineering by Shravan 2022 (above), Grimm 1894 (below)

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#### **Rigid connections**

#### Box girders/anchor bolts

### CONCLUSION

Technical structural differences between column-to-foundation attachments and direction of steel reinforcement determined the fate of these two structures, and the usage of box girders and steel rings could have been applied to prevent Rana Plaza's collapse. This is important in light of the fatalities that occurred.

\*Credit: Grimm, C.R. 1984. "The Tower of the New City Hall at Philadelphia, PA." Islam, R., Azad, M.A.K., Sinha, A., Lixon, M. 2017. "An Investigation of Recent Building Collapses around the World with Special References to Rana Plaza." Manzur, T., Mahmood M.H., Baten, B., et.al. 2020. "Assessment of Progressive Collapse Proneness of Existing Typical Garment Factory Buildings in Bangladesh."

Newman, A. 2021. Structural Renovation of Buildings: Methods, Details, and Design Examples. 2nd Ed.

#### No lateral reinforcement Rings and diagonals