



OFFICE OF RESEARCH & DEVELOPMENT

2012 **R&D**
REVIEW

Train Occupant Protection



U.S. Department
of Transportation

Federal Railroad
Administration

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Office of Research and Development
Office of Railroad Policy and Development

Program Area & Risk Matrix

Train Occupant Protection

Program Areas	Risk Factors	Trespass	Grade Crossing	Derailment	Train Collision	All Other Safety Hazards
Railroad Systems Issues						
Human Factors						
Track & Structures						
Track & Train Interaction						
Facilities & Equipment						
Rolling Stock & Components						
Hazardous Materials						
Train Occupant Protection				X	X	
Train Control & Communications						
Grade Crossings & Trespass						

Crashworthiness

- Crashworthiness of freight and passenger locomotives
- Safety of inter-city and commuter cars
- Review of recent collisions to evaluate FRA Regulation adopted in 2007
- Assistance to Office of Safety in regulatory implementation for crashworthiness, fuel tanks
- Mitigate effects of collisions and derailments
- Crew protection within cab compartment
- Passenger car safety and comfort enhancements
- Reduce incidences of accidents and cost of repair

Crashworthiness

- FRA rule in effect now
- Addresses fuel tank safety S-5506
- Addresses emergency egress in a limited way
- Training course for locomotive egress developed and tested at fire departments
- Rear window emergency exit now developed per NTSB recommendation

Metrolink Crash in Chatsworth



(Photo by Hector Mata/AP)

Crashworthiness

- In order to evaluate the crashworthiness of freight locomotives involved in the accident, inline collision between two trains was simulated using finite element method (FEM) and LS-DYNA software package that also included dummies for crew injury evaluation.
- The results of finite element analysis (FEA) revealed that the anti-climber and the collision posts of the lead EMD SD-70ACe locomotive functioned properly and met with their design objectives.
- The resulting crash forces acting on the collision posts were found to be of lower magnitudes than the permissible design limit values specified in the AAR Standard S-580, revision date 2004.
- The collision posts further prevented loss of occupant survival space in the cab of SD70 locomotive.
- The anti-climber contributed toward preventing override and therefore ensured safety of SD70 crew.

Three CSX trains collided in Northern Indiana



(Photo by CNN)

Acknowledgements & Stakeholders

Subject: CSX accident in Northern Indiana

Ms. Strang and everyone else,

I would like to express my thanks to all those in the FRA, the industry and the labor organizations who worked for years on the enhanced Crashworthiness standards for freight locomotives. The work of all of you providing a vehicle that allows for operating crews to survive the catastrophic accidents that happen in our industry.

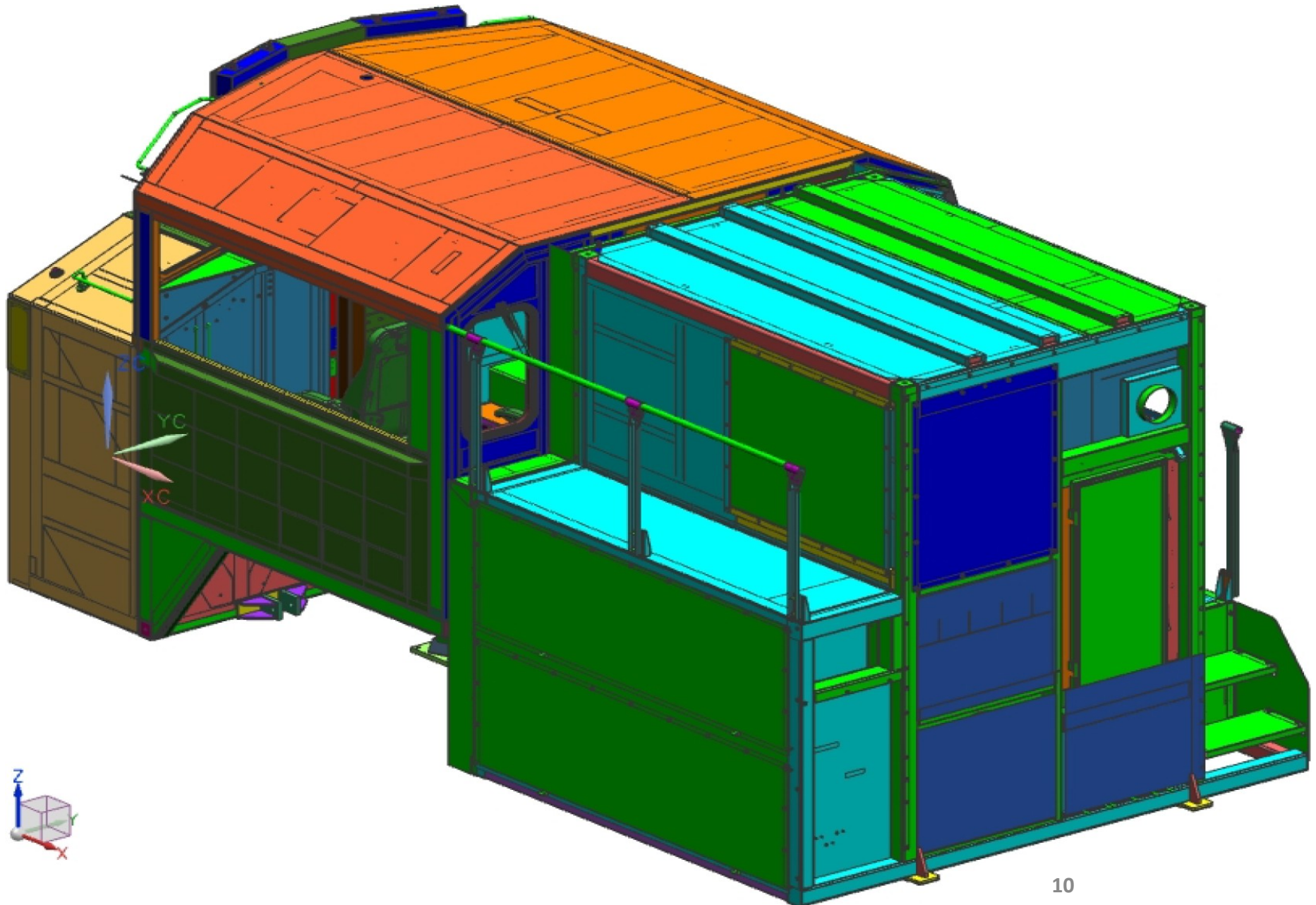
On January 9, 2012 three CSX trains collided in Northern Indiana and everyone survived. It is my understanding that the locomotives involved in this accident were all wide body enhance locomotives. It is nice to know that we all made a difference. It allowed the crews on these trains to go home to their families.

Thanks again,

*William Verdeyen
BLET Chairman INSLB
Teamsters Rail Conference*

Emergency Egress Project

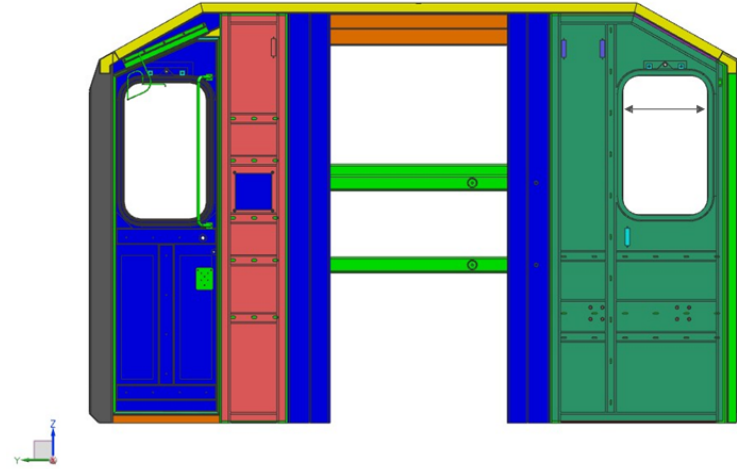
- NTSB final report on Chatsworth, CA accident cited FRA Research and recommended as Rear Window egress be added
- FRA R&D IN SUPPORTING AAR/Railroads to develop additional egress means
- Electro-Motive Diesel (EMD) was awarded a grant to accomplish this
- Progress to date is described
- Goal is to have a design common to all locomotive builders



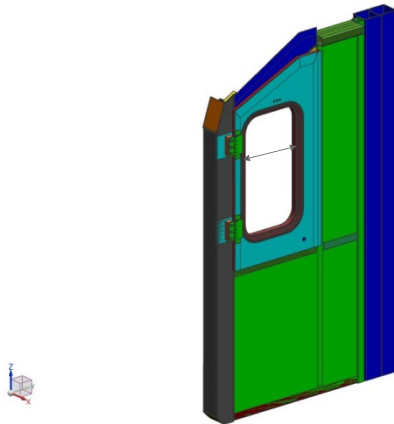
Rear Cab View



Inside Cab View with Standard Window



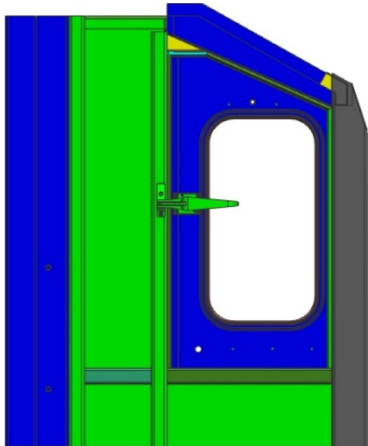
Outside View – Window Narrowed 2 in.



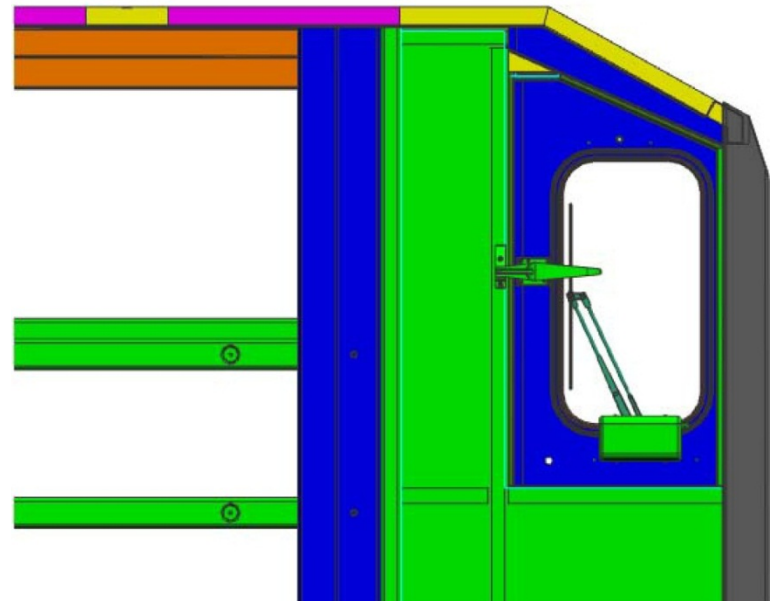
Outside View - Escape Door



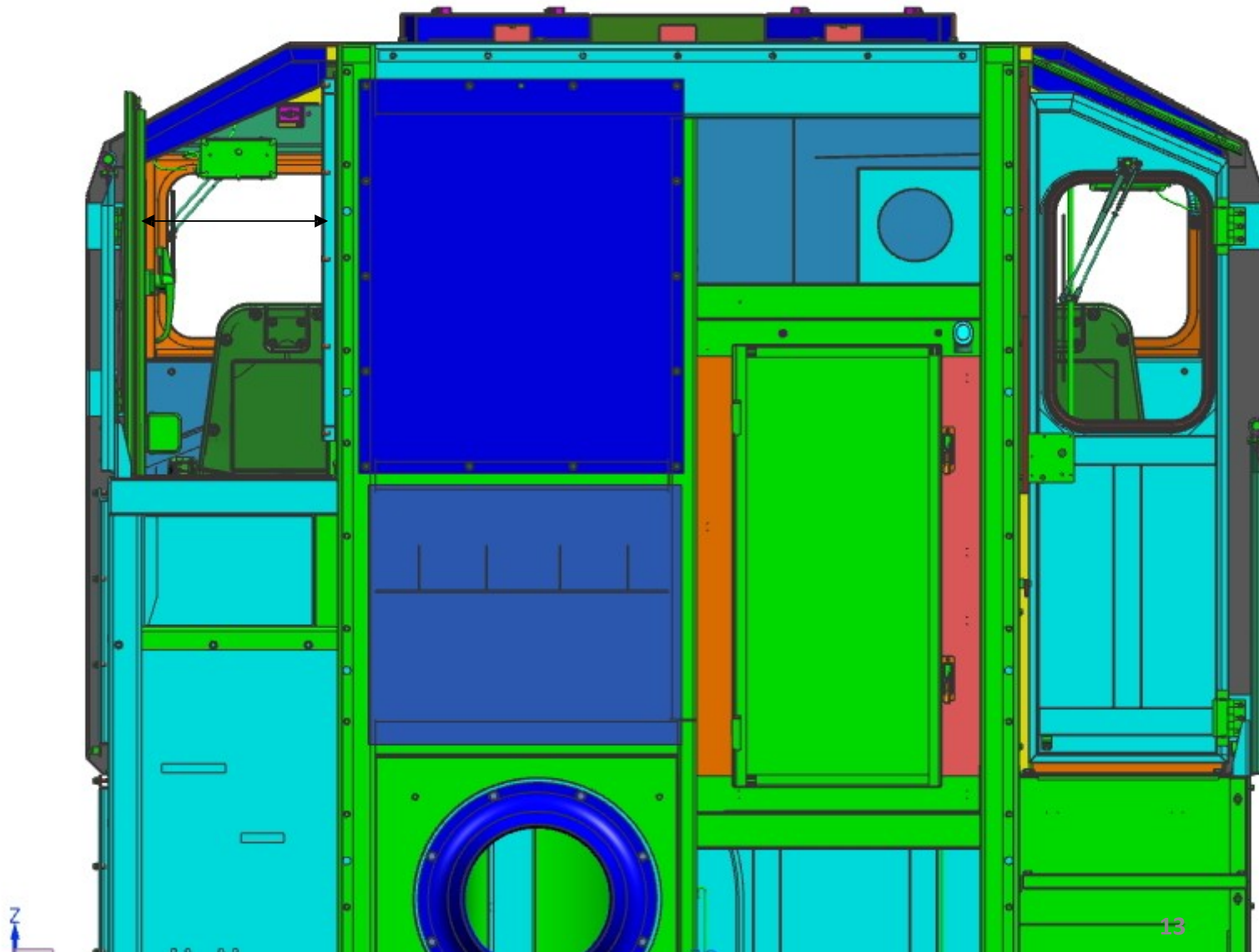
Inside View – Door Latched Closed

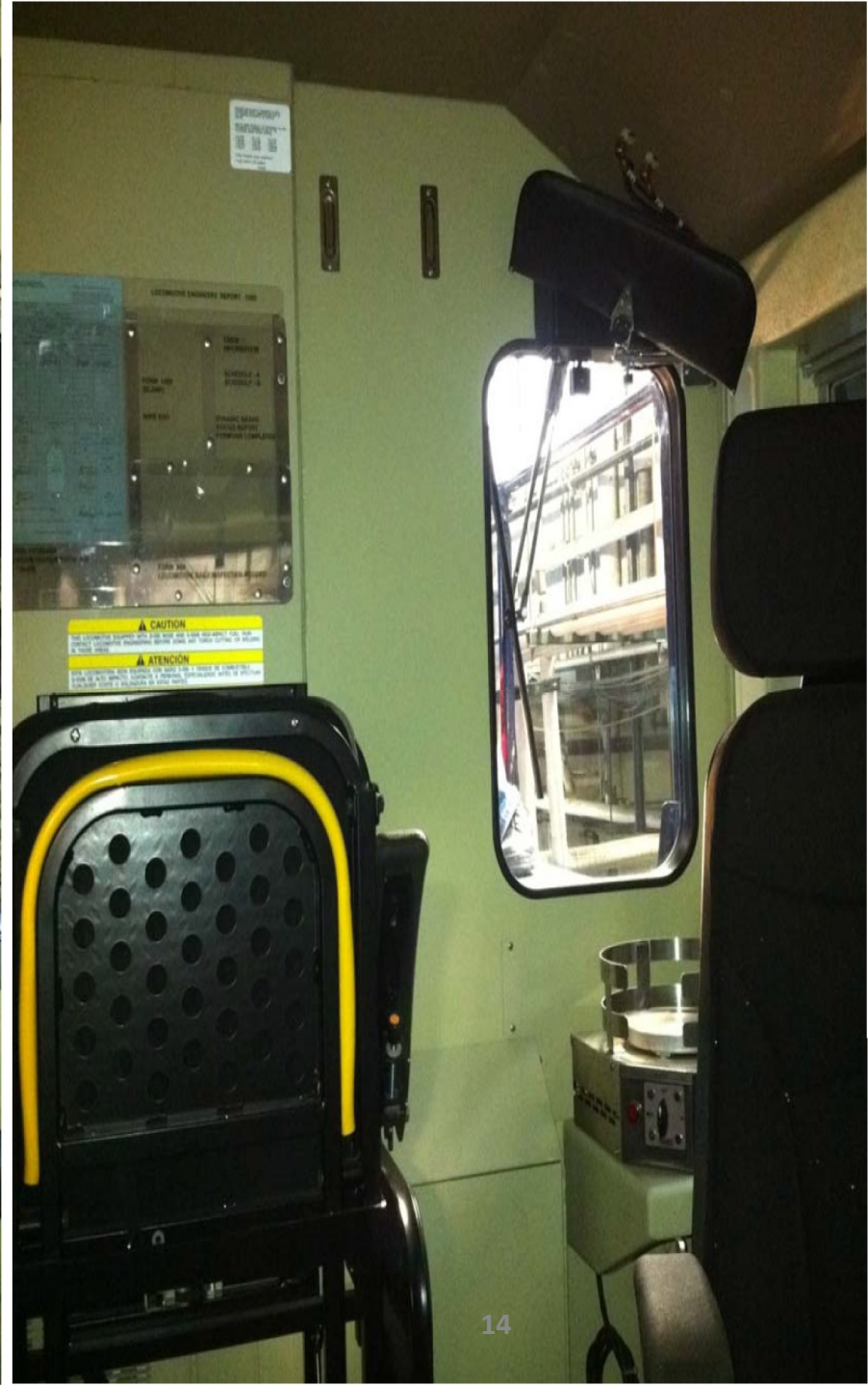


Door Latch and Wiper Motor



Escape Opening Width Door-To-Frame 19.5 in







Summary

- An emergency escape route can be designed into the left rear wall of the cab.
- The escape route will incorporate a ½ door mirror image of the right rear door
- The door will provide a 19 ½ inch wide escape route.
- The rear door window width will be reduced 2 inches to 13 ½ inches.
- An inside only release handle will be required.
- The wiper motor is relocated to the bottom of the door.

Lunch | Nearby Food Options

(all within 5-7 minutes walking distance)



- Au Bon Pain: 601 Indiana Ave NW # 1 Washington, DC 20004
- Burger King: 501 G Street NW, Washington, DC 20001
- Chipotle: 601 F Street NW, Washington, DC 20005
- Cosi: 601 Pennsylvania Ave NW # 2 Washington, DC 20004
- Dunkin Donuts: 601 F Street NW, Washington, DC 20004
- Firehook Bakery & Coffee House: 441 4th Street NW, Washington, DC 20001
- Jack's Famous Deli: 501 3rd St NW # 2, Washington, DC 20001
- Quiznos Sandwiches: 772 5th St NW, Washington, DC 20001
- Starbucks: 443 7th St. NW, Washington, DC 20004
- Subway: 501 D Street NW, Washington, DC 20001