



Memo

Date: Friday, March 08, 2019

Project: GPC6, C-2012668-02, Task Order #39 Dallas CBD Second Light Rail Alignment (D2 Subway)

To: Ernie Martinez, D2 Project Manager

From: Gregory Tallos AIA, D2 Architectural Lead

Subject: D2 CBD East Subway Station Architectural Narrative

Purpose

This Memorandum is intended to supplement the 10% architectural submittal for Dallas Area Rapid Transit (DART), establishing a design narrative for the D2 CBD East Subway Station. The design criteria used to generate this memorandum is similar to the criteria that is established for the designs of Commerce Street Station and Metro Center Station. This memorandum should not be the only document used for the design of this station, but included are only some initial thoughts from the architectural team. As the team starts involving stakeholders, DART personnel and the Public at large into discussions about this station design, these concepts listed in this memorandum will be subject to modification until consensus is reached.

Proposed Site Location

The location identified for this station is along the current alignment, diagonally cutting across multiple sites, traveling between Pacific Ave, Elm Street and Main Street. The site also runs parallel to S Pearl St and N Cesar Chavez Blvd. The current alignment clips the corner of the building with the dual address of 2107 & 2109 Main Street. This building will need to be demolished to allow construction of the station. The building adjacent to this location, 2121 Main Street, will remain untouched. Another building located at 108 S Pearl St, will also need to be demolished to allow for construction of the station. All remaining lots in this vicinity are parcels currently being used for surface parking, with no other impacts to existing structures currently foreseen.

Station Design Concept

Every station that is part of the new Dallas D2 Subway provides its own challenges and design hurdles. The CBD East Station is currently conceptualized as a cut and cover station, similar to the Metro Center Station, but at a much shallower depth. Due to this depth limitation, there could be challenges incorporating a mezzanine at this station. If so, only a street level entrance and a center platform guarded by Platform Edge Doors would be required (as is being implemented in the other underground stations). After further coordination, and if determined to be the preferred direction, fare control for the station would be housed internally in three station entrance buildings, located on the North side of Elm Street at the north end of the platform, North side of Main Street at the current building location of 2107 & 2109 Main Street, and at the corner of Pearl and Main, on the Southeast corner. These entrance



buildings would not only function as the control point for the station, but serve as necessary locations for vertical circulation, and house the critical electrical/mechanical and support spaces for the station. With the station going directly under Elm Street and Main Street, this allows options for daylighting apertures through the sidewalk surface and possibly through the entrance buildings. The design team will be mindful of these subway entrance locations adjacent to existing design methodologies, while minimizing site impact for future growth. These ideas will be shared, and the team will listen further to stakeholders at the upcoming CBD East Focus Area meeting currently planned for March 28th, 2019. Ideas and concepts expressed in this memo will be subject to change or revisions after stakeholder input and direction is received in this Focus Area meeting and further one-on-one meetings.

Future growth is also critical to the success of this station, including growth to be built right over the top of the station. For this reason, the design team is planning on lowering the top of the station box to allow large grade transfer beams to be placed above the station at the discretion of future development, without disturbing operations of the station, and maintaining future design opportunities.

Architectural Narrative

As pedestrians enter the station from Street Level into one of the three building entrances, one at Elm and two at Main Street, the customer will be greeted with a large double volume glass lobby, daylight allowed to refract and illuminate the space. This building location preferences will be discussed with stakeholders as design development progresses. Within these station entrance buildings, at locations where appropriate, there will be seating for customers taking local bus routes and/or future streetcar. Continuing similar designs at the other Subway station entrances, DART police will have a small viewing office of the fare control zone, with a viewing window for the public, and a flank of station CCTV monitors behind them. As customers pass through the fare collectors, they will be able to look down toward the station platform, visually identifying their destination. If choosing an escalator to descend to the platform, they will descend on a step wide enough for a person and luggage. If the customer requires an elevator, a glass walled redundant elevator will be available. At the platform level, customers will have ample space for circulation along the platform on either side of the vertical circulation coming into the central area of the platform. The Platform Edge Doors are built from platform to ceiling, providing climate control and deterring unauthorized entry to the track level. An automated train control (ATC) system might be implemented to assist lining up the train doors with the PED doors when trains stop at the station. The ends of the platform could house emergency support rooms for the Dallas Fire Department, and other necessary service areas needed for platform operations.

The remainder of the service spaces, including mechanical/electrical and other necessary areas required for station operations, could be housed within the surface entrance buildings. At street level, below grade or above, these areas will have restricted access from the public, accessed by staff only through service doors.

Appendix

(None)

NFPA 130 SUMMARY REPORT: PEAK HOUR PATRONAGE DATA (LOS C MATRIX)

CENTER PLATFORM CONCEPT

<p>Name of Station <u>Metro Center Station</u></p> <p>Design Year <u>Assumed Full System - Date 2040/2050</u></p> <p>Assumed Headway Interval <u>3.75</u> minutes</p> <p>Maximum Calculated Train Load <u>495</u> passengers (Crush Load)</p> <p>Platform Length <u>410</u> Feet</p> <p style="text-align: center;">(This is from inside face of PED doors to other side)</p> <p>Platform Width <u>25</u> Feet</p> <p>Standard Stair Width <u>8</u> Feet</p> <p>Number of Escalators <u>4</u></p> <p>Escalator Nominal Width <u>4</u> Feet = 100 pedestrians per minute</p> <p>Level of Service - Normal <u>C</u> = 7.00 ft² per person</p> <p style="padding-left: 20px;">- Emergency <u>D</u> = 3.00 ft² per person</p>	<p><i>Provided by DART. Four future Lines (per track)</i></p> <p><i>Per train. 3-Car consist SLRV</i></p> <p><i>DART standard for Below-grade station</i></p> <p><i>Assumed minimums: 8' clear from platform edges 16' Two adjacent escalators.</i></p> <p><i>1200, 800, 600mm nominal widths. (4', 2'-6" and 2')</i></p> <p><i>0.70 m² per person</i></p> <p><i>0.30 m² per person</i></p>									
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<p>NOTES: * Peak Direction is the direction with the largest sum of Link and Entraining loads. Generate results for both am and pm peak periods to determine worst case scenario</p>										

1	PLATFORM OCCUPANT LOAD EMERGENCY CONDITIONS (MISSED HEADWAY) CENTER PLATFORM	Peak Direction	Off Peak Direction	
1a	Entraining Load per Hour from Patronage Data	1,980	1,980	
1b	Calculated Entraining Load-Peak Direction (East) $((1a \text{ Peak} \times 0.25) / 15)$ $\times 1.3 \text{ Surge} \times (2 \times \text{Headway-Missed})$	322		<i>Formula From NFPA. Converting hours to minutes NFPA 5.3.2.5 (3)</i>
1c	Calculated Entraining Load-Peak Direction (West) $((1a \text{ Off Peak} \times 0.25) / 15)$ $\times 1.3 \text{ Surge} \times (2 \times \text{Headway-Missed})$		322	<i>Formula From NFPA. Converting hours to minutes NFPA 5.3.2.5 (3)</i>
1d	Entraining Load per Platform $1b + 1c$	644		<i>NFPA 5.3.2.5 (2)</i>
1e	Link Load per Hour from Patronage Data Cover Sheet	7,920	7,920	
1f	Calculated Link Load - Peak Direction (East) $((1e \text{ Peak} \times 0.25) / 15)$ $\times 1.3 \text{ Surge} \times (2 \times \text{Headway-Missed})$	1,287		<i>NFPA 5.3.2.5 (6)</i>
1g	Calculated Link Load - Off Peak Direction (West) $((1e \text{ Off Peak} \times 0.25) / 15)$ $\times 1.3 \text{ Surge} \times (2 \times \text{Headway-Missed})$		1,287	<i>NFPA 5.3.2.5 (6)</i>
1h	Maximum Calculated Train Load from Patronage Data Cover Sheet	495		
1i	Link Load per Track lesser of 1f or 1h in Peak Direction lesser of 1g or 1h in Off Peak Direction	495	495	<i>NFPA 5.3.2.5 (7)</i>
1j	Link Load per Platform $1i \text{ Peak} + 1i \text{ Off Peak}$	990		<i>NFPA 5.3.2.5 (5)</i>
1k	Platform Occupant Load $1d + 1j$	1,634		<i>NFPA 5.3.2.5 (1)</i>
2 EGRESS REQUIREMENTS - CENTER PLATFORM				
2a	Required Evacuation Flow per Minute $1k / 4 \text{ minutes}$	408		<i>NFPA 5.3.3.1</i>
2b	Permitted Number of Escalators for Egress $(1k \times 0.5)$ $/ (\text{pedestrians per minute} \times \text{headway})$ ppm from Patronage Data Cover Sheet	3		<i>NFPA 5.3.5.4 (NFPA 5.3.5.5)</i>
2c	Number of Escalators from Patronage Data Cover Sheet	4		
2d	Escalator Capacity per Minute lesser of $(2a \times 0.5)$ and $((2c - 1) \times \text{pedestrians per minute})$ ppm from Patronage Data Cover Sheet	205		<i>NFPA 5.3.5.3</i>
2e	Required Vertical Egress Width in feet $(2a - 2d) / 1.41 \text{ pedestrians per inch-min.}$ to nearest inch	12.139 ft		<i>NFPA 5.3.5.3</i>
2f	Number of Standard Width Stairs $2e / \text{Standard Stair Width}$ Stair Width from Patronage Data Cover Sheet	2		<i>NFPA 5.3.5.2</i>
2g	Required Horizontal Egress Width in Feet $2a / 2.08 \text{ pedestrians per inch-minute}$ includes 1-foot at each side wall to nearest inch	5.725 ft		<i>81.9 people per min NFPA 5.3.4 (NFPA 5.3.4.3)</i>

3	PLATFORM OCCUPANT LOAD NORMAL PEAK CONDITIONS WITH MISSED HEADWAY CENTER PLATFORM	Peak Direction	Off Peak Direction	
3a	Detraining Load per Hour from Patronage Data Cover Sheet	3,960	3,960	
3b	Calculated Detraining Load - Peak Direction $((3a \text{ Peak} \times 0.25) / 15)$ $\times 1.3 \times \text{Headway}$	322		
3c	Calculated Detraining Load - Off Peak Direction $((3a \text{ Off Peak} \times 0.25) / 15)$ $\times 1.3 \times \text{Headway}$		322	
3d	Detraining Load per Track lesser of 3a or 3b in Peak Direction lesser of 3a or 3c in Off Peak Direction	322	322	
3e	Detraining Load per Platform 3d Peak + 3d Off Peak	644		NFPA 5.3.2.5 (2)
3f	Platform Occupant Load 1d + 3e	1,287		NFPA 5.3.2.5 (5)
4	PLATFORM WIDTH NORMAL PEAK CONDITIONS CENTER PLATFORM			
4a	Required Circulation Area in Square Feet 3f x Normal LOS Normal LOS from Cover Sheet to nearest ft ²	9,009 ft²		
4b	Required Platform Width in Feet 4a / required platform length add 2-foot platform edge length from Patronage Data Cover Sheet to nearest inch	23.975 ft		
5	PLATFORM WIDTH EMERGENCY CONDITIONS CENTER PLATFORM			
5a	Required Circulation Area in Square Feet 3f x Emergency LOS Emergency LOS from Cover Sheet to nearest ft ²	3,861 ft²		
5b	Required Platform Width 5a / required platform length add 2-foot platform edge length from Patronage Data Cover Sheet to nearest inch	11.425 ft		

6	VERTICAL CIRCULATION NORMAL PEAK CONDITIONS CENTER PLATFORM	
6a	Number of Escalators - Entraining 1d / (pedestrians per minute x headway) ppm from Patronage Data Cover Sheet assumes 100% escalator use	2
6b	Number of Escalators - Detraining 3e / (pedestrians per minute x headway) ppm from Patronage Data Cover Sheet assumes 100% escalator use	2
6c	Number of Standard Width Stairs 3f / (55 pedestrians/min. x stair width x headway) Stair Width from Patronage Data Cover Sheet assumes 100% stair use	1
7	RESULTING LEVEL OF SERVICE EMERGENCY CONDITIONS CENTER PLATFORM	
7a	Vertical Circulation Area - Stairs (Stair Width + 8") x (15'-0"+10'-0") x 2f to nearest ft ²	434 ft²
7b	Vertical Circulation Area - Escalators (Nominal Escalator Width + 2ft) x (20'-0"+20'-0") to nearest ft ²	360 ft²
7c	Platform Area for Circulation (Platform Width x Length) - (7a + 7b) to nearest ft ²	9457 ft²
7d	Emergency Level of Service 7c / 1k	C 6.27 ft ² per person
8	RESULTING LEVEL OF SERVICE NORMAL CONDITIONS CENTER PLATFORM	
8a	Vertical Circulation Area - Stairs (Stair Width + 8") x (15'-0"+10'-0") x 2f to nearest ft ²	434 ft²
8b	Vertical Circulation Area - Escalators (Nominal Escalator Width + 2ft) x (20'-0"+20'-0") x (6a + 6b) to nearest ft ²	480 ft²
8c	Platform Area for Circulation (Platform Width x Length) - (8a + 8b) to nearest ft ²	9337 ft²
8d	Normal Level of Service 8c / 3f	C 7.25 ft ² per person

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CENTER PLATFORM CONCEPT

<p>Name of Station <u>Commerce Station</u></p> <p>Design Year <u>Assumed Full System - Date 2040/2050</u></p> <p>Assumed Headway Interval <u>3.75</u> minutes</p> <p>Maximum Calculated Train Load <u>495</u> passengers (Crush Load)</p> <p>Platform Length <u>515</u> Feet</p> <p style="text-align: center;">(This is from inside face of PED doors to other side)</p> <p>Platform Width <u>20.5</u> Feet</p> <p>Standard Stair Width <u>8</u> Feet</p> <p>Number of Escalators <u>4</u></p> <p>Escalator Nominal Width <u>4</u> Feet = 100 pedestrians per minute</p> <p>Level of Service - Normal <u>C</u> = 7.00 ft² per person</p> <p style="padding-left: 20px;">- Emergency <u>D</u> = 3.00 ft² per person</p> <div style="display: flex; justify-content: space-around; align-items: flex-end; margin-top: 20px;"> <div style="text-align: center;"> <p>Entraining / hour</p> <div style="border: 1px solid black; padding: 5px; width: 100px;"> <p>1,980</p> <p>25% of link</p> </div> </div> <div style="text-align: center;"> <p>Detraining / hour</p> <div style="border: 1px solid black; padding: 5px; width: 100px;"> <p>3,960</p> <p>50% of link</p> </div> </div> <div style="text-align: center;"> <p>Link Load / hour</p> <div style="border: 1px solid black; padding: 5px; width: 100px;"> <p>7,920</p> <p><--16 Trains/Hr at 495 people each</p> </div> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>← Peak Direction*</p> </div> <div style="text-align: center; margin-top: 20px;"> <div style="border: 1px solid black; padding: 10px; width: 80%; margin: 0 auto;"> <p>PLATFORM</p> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <p>Off Peak Direction →</p> <p>←</p> <p>←</p> </div> <div style="display: flex; justify-content: space-around; align-items: flex-end; margin-top: 20px;"> <div style="text-align: center;"> <p>7,920</p> <p><--16 Trains/Hr at 495 people each</p> <p>Link Load / hour</p> </div> <div style="text-align: center;"> <p>3,960</p> <p>50% of link</p> <p>Detraining / hour</p> </div> <div style="text-align: center;"> <p>1,980</p> <p>25% of link</p> <p>Entraining / hour</p> </div> </div> </div>	<p><i>Provided by DART. Four future Lines (per track)</i></p> <p><i>Per train. 3-Car consist SLRV</i></p> <p><i>DART standard for Below-grade station</i></p> <p><i>Assumed minimums: 8' clear from platform edges 16' Two adjacent escalators.</i></p> <p><i>1200, 800, 600mm nominal widths. (4', 2'-6" and 2')</i></p> <p><i>0.70 m² per person</i></p> <p><i>0.30 m² per person</i></p> <p style="text-align: center; margin-top: 20px;"><i>Assuming at AM peak.</i></p> <p><i>Since Commerce is in centre of the line, people are mostly detraining. But some are also getting on.</i></p> <p style="text-align: right; margin-top: 10px;">Southbound</p> <p style="text-align: center; margin-top: 20px;"><i>Assuming combination of 4 all 4 future LRT lines</i></p> <p style="text-align: right; margin-top: 10px;">Northbound</p> <p style="margin-top: 20px;"><i>Assuming at AM peak. 25% and 50% of link are assumed values</i></p>
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1h	Maximum Calculated Train Load from Patronage Data Cover Sheet	495		
1i	Link Load per Track lesser of 1f or 1h in Peak Direction lesser of 1g or 1h in Off Peak Direction	495	495	<i>NFPA 5.3.2.5 (7)</i>
1j	Link Load per Platform $1i \text{ Peak} + 1i \text{ Off Peak}$	990		<i>NFPA 5.3.2.5 (5)</i>
1k	Platform Occupant Load $1d + 1j$	1,634		<i>NFPA 5.3.2.5 (1)</i>
2 EGRESS REQUIREMENTS - CENTER PLATFORM				
2a	Required Evacuation Flow per Minute $1k / 4 \text{ minutes}$	408		<i>NFPA 5.3.3.1</i>
2b	Permitted Number of Escalators for Egress $(1k \times 0.5)$ $/ (\text{pedestrians per minute} \times \text{headway})$ ppm from Patronage Data Cover Sheet	3		<i>NFPA 5.3.5.4 (NFPA 5.3.5.5)</i>
2c	Number of Escalators from Patronage Data Cover Sheet	4		
2d	Escalator Capacity per Minute lesser of $(2a \times 0.5)$ and $((2c - 1) \times \text{pedestrians per minute})$ ppm from Patronage Data Cover Sheet	205		<i>NFPA 5.3.5.3</i>
2e	Required Vertical Egress Width in feet $(2a - 2d) / 1.41 \text{ pedestrians per inch-min.}$ to nearest inch	12.139 ft		<i>NFPA 5.3.5.3</i>
2f	Number of Standard Width Stairs $2e / \text{Standard Stair Width}$ Stair Width from Patronage Data Cover Sheet	2		<i>NFPA 5.3.5.2</i>
2g	Required Horizontal Egress Width in Feet $2a / 2.08 \text{ pedestrians per inch-minute}$ includes 1-foot at each side wall to nearest inch	5.725 ft		<i>81.9 people per min NFPA 5.3.4 (NFPA 5.3.4.3)</i>

3	PLATFORM OCCUPANT LOAD NORMAL PEAK CONDITIONS WITH MISSED HEADWAY CENTER PLATFORM	Peak Direction	Off Peak Direction	
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3c	Calculated Detraining Load - Off Peak Direction $((3a \text{ Off Peak} \times 0.25) / 15)$ $\times 1.3 \times \text{Headway}$		322	
3d	Detraining Load per Track lesser of 3a or 3b in Peak Direction lesser of 3a or 3c in Off Peak Direction	322	322	
3e	Detraining Load per Platform 3d Peak + 3d Off Peak	644		NFPA 5.3.2.5 (2)
3f	Platform Occupant Load 1d + 3e	1,287		NFPA 5.3.2.5 (5)
4	PLATFORM WIDTH NORMAL PEAK CONDITIONS CENTER PLATFORM			
4a	Required Circulation Area in Square Feet 3f x Normal LOS Normal LOS from Cover Sheet to nearest ft ²	9,009 ft²		
4b	Required Platform Width in Feet 4a / required platform length add 2-foot platform edge length from Patronage Data Cover Sheet to nearest inch	19.500 ft		
5	PLATFORM WIDTH EMERGENCY CONDITIONS CENTER PLATFORM			
5a	Required Circulation Area in Square Feet 3f x Emergency LOS Emergency LOS from Cover Sheet to nearest ft ²	3,861 ft²		
5b	Required Platform Width 5a / required platform length add 2-foot platform edge length from Patronage Data Cover Sheet to nearest inch	9.500 ft		

6	VERTICAL CIRCULATION NORMAL PEAK CONDITIONS CENTER PLATFORM	
6a	Number of Escalators - Entraining 1d / (pedestrians per minute x headway) ppm from Patronage Data Cover Sheet assumes 100% escalator use	2
6b	Number of Escalators - Detraining 3e / (pedestrians per minute x headway) ppm from Patronage Data Cover Sheet assumes 100% escalator use	2
6c	Number of Standard Width Stairs 3f / (55 pedestrians/min. x stair width x headway) Stair Width from Patronage Data Cover Sheet assumes 100% stair use	1
7	RESULTING LEVEL OF SERVICE EMERGENCY CONDITIONS CENTER PLATFORM	
7a	Vertical Circulation Area - Stairs (Stair Width + 8") x (15'-0"+10'-0") x 2f to nearest ft ²	434 ft²
7b	Vertical Circulation Area - Escalators (Nominal Escalator Width + 2ft) x (20'-0"+20'-0") to nearest ft ²	360 ft²
7c	Platform Area for Circulation (Platform Width x Length) - (7a + 7b) to nearest ft ²	9764 ft²
7d	Emergency Level of Service 7c / 1k	C 6.46 ft ² per person
8	RESULTING LEVEL OF SERVICE NORMAL CONDITIONS CENTER PLATFORM	
8a	Vertical Circulation Area - Stairs (Stair Width + 8") x (15'-0"+10'-0") x 2f to nearest ft ²	434 ft²
8b	Vertical Circulation Area - Escalators (Nominal Escalator Width + 2ft) x (20'-0"+20'-0") x (6a + 6b) to nearest ft ²	480 ft²
8c	Platform Area for Circulation (Platform Width x Length) - (8a + 8b) to nearest ft ²	9644 ft²
8d	Normal Level of Service 8c / 3f	C 7.49 ft ² per person