Introduction:

This report summarizes queuing analyses results for Metro Gold Line station entrances and also identify the number of fare gates required at each station entrance specified below:

- **Atlantic East**
- **Atlantic West**
- **Chinatown North (elevator-only entrance)**
- **Chinatown Mezzanine East Side**
- **Chinatown Mezzanine West Side**
- **Chinatown South**
- **Highland Park East**
- **Highland Park West**
- **Indiana North**
- **Indiana South**
- **Del Mar East**
- **Del Mar West**

Key Source of Input Data and List of Assumptions:

1. **Projected Ridership Growth**: For Gold Line stations (Atlantic, Chinatown, Highland Park, Indiana and Del Mar), ridership demand is modeled based on ridership projections provided by Metro (***Gold Line Stations – Peak by Hour.xlsx***) via email dated 01/12/15. As directed by Metro's email dated 03/25/15, see **Table 1 and 2** for ridership projections to calculate year 2024 ridership. A demand model has been created based on year 2024 ridership projections to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long.

   Table 1 shows ridership growth for all the stations as per data provided by Metro (***Future Gold Line and Blue Line Station Growth Ridership Projection.xlsx***). However, as directed by Metro (email dated 03/25/15), to calculate 2024 ridership, worst case ridership growth projection of 34% has been assumed for all the inline stations (i.e. Highland Park, Indiana and Del Mar). 58% of ridership growth projection has been assumed to calculate year 2024 ridership at Chinatown anticipating special events. 43% of ridership growth projection has been assumed to calculate year 2024 ridership at Atlantic station considering it is a terminal station.

Station	2024 Ridership Growth
Atlantic	43%
Indiana	34%
Chinatown	58%
Highland Park	28%
Del Mar	26%

Table 1: Ridership Projections for each station

Station Name	2024 Ridership Growth Rate Per Metero email 03/25/15
Atlantic (Terminal Station)	43%
Chinatown (Special Event)	58%
Highland Park (Inline Station)	34%
Indiana (Inline Station)	34%
Del Mar (Inline Station)	34%

Table 2: Ridership Projections for each station

Ridership data for year 2014 was provided. Maximum passenger boarding and alighting for Atlantic, Chinatown and Highland Park is between 5pm and 6pm, for Indiana between 3pm and 4pm and for Del Mar between 6pm and 7pm. Total maximum boarding and alighting for each station is considered for worst case scenario. **Table 3** shows ridership data for AM and PM peak period for year 2014. **Table 4** shows worst case/ maximum total boarding and alighting during peak of the peak hour.

AM and PM Peak Period Boarding + Alighting	ATLANTIC	CHINATOWN	HIGHLAND PARK	INDIANA	DEL MAR
06	189	88	203	111	75
07	315	189	377	207	196
08	241	163	345	152	220
15	384	294	422	274	192
16	372	309	456	269	232
17	397	353	518	258	281
18	313	254	415	229	289
Maximum Total Boarding + Alighting	397	353	518	274	289

Table 3: Maximum Total Boarding and Alighting by AM and PM Peak period

Worst Case Peak Hour Ridership (Per Metro's 2014 Ridership Data)						
Station Name	Duration	Boarding	Alighting	Max Total (Boarding + Alighting)	2024 Ridership Growth Rate Per Metro email 03/25/15	2024 Peak Hour Ridership
Atlantic (Terminal Station)	5pm to 6pm	154	243	397	43%	568
Chinatown (Special Event)	5pm to 6pm	200	153	353	58%	558
Highland Park (Inline Station)	5pm to 6pm	207	311	518	34%	694
Indiana (Inline Station)	3pm to 4pm	115	159	274	34%	367
Del Mar (Inline Station)	6pm to 7pm	108	181	289	34%	387

Table 4: Worst Case Peak Hour Ridership

2. For preliminary analysis, ADA gates that only cater to elevator passenger flow will be considered negligible due to varying elevator utilization factors, service times and capacities. The peak surge flow will still be applied to the remaining regular turnstile gates to represent the worst-case situation. Where an ADA gate is planned to be installed amongst the regular turnstiles in fare gate entrances, its throughput will be considered the same as a regular turnstile for this analysis. A

demand model has been created to estimate the amount of people each station must service during a peak surge that lasts one or two minutes long

3. **Gate Utilization:** All station entrances of Atlantic, Chinatown, Highland Park, Indiana and Del Mar have been analyzed to evaluate the fare gate capacity for each station entrance. Gate utilization table below shows that specific percentage of passengers will utilize each gate. For example, if a station has two gates, technically 50% of peak of the peak hour passengers utilize each gate. However, as per Metro's direction to consider the worst case scenario, model assumes 70% passengers utilizes each gate as worst case scenario to check the fare gate capacity at each entrance for all stations except Chinatown North (Elevator-Only entrance) and Chinatown Mezzanine East entrance.

No.	Station Name/ Entrance	Overall Platform Length (ft.)	Distance Between Platform midpoint and planned Fare Gates (ft.)	Drawing Reference Contract # / Drawing # / Sheet #	Gate Utilization
1	Atlantic - East	270	135	C0801 / A-101 / 8031	70%
	Atlantic - West	270	135	C0801 / A-101 / 8031	70%
2	Chinatown - North (elevator-only)	318	70	2000-02 / A-B110 through A-B1114	30%
	Chinatown - Mezzanine East	318	105	2000-02 / A-B110 through A-B1114	30%
	Chinatown - Mezzanine West	318	105	2000-02 / A-B110 through A-B1114	70%
	Chinatown - South	318	150	2000-02 / A-B110 through A-B1114	70%
3	Highland Park - East	319	225	2000-02 / A-F610	70%
	Highland Park - West	319	160	2000-02 / A-F610	70%
4	Indiana - North	270	135	C0801 / A-101 / 5035	70%
	Indiana - South	270	135	C0801 / A-101 / 5035	70%
5	Del Mar - East	279	135	2000-02 / A-I711	70%
	Del Mar - West	279	140	2000-02 / A-I711	70%

Table 5: Gate Utilization and Location of Planned Fare Gates

- **Scenario 1:** Planned Number of Fare Gates based on station layout and infrastructure limitations (Turnstiles and ADA Fare Gates)
- **Scenario 2:** Maximum number of fare gates based on EQA (Equipment Quantity Analysis).
- **Scenario 3:** Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.).

4. **Headway and Trains Per Hour (TPH):** *As per data Metro's future operating plan*

   - AM and PM Peak period headway: **5 minute**
   - Peak period TPH: **12**

5. **Peak Hour Surge:**

   - The peak surge demand (the highest amount of arrivals at a fare gate within a one-to-two minute time period) is dependent upon the number of trains that arrive at each station during a peak hour. Based on the July 2008 data collection effort at Metro, it is assumed that a percentage of total hourly passengers will all arrive at once causing a peak influx to the fare gates. In a peak hour where a total of 100 passengers pass through a set of fare gates, only 10 of the 100 passengers might arrive in the first surge, representing 10% of the hourly total; while 30 passengers might arrive in the next surge, representing 30% of the hourly total. In order to plan for the peak influx during a peak hour, the highest observed percentage that arrived in a surge is used in the demand model to capture the worst-case scenario.

   - The arrival surge is affected by the distance from the midpoint of the station platforms to the planned fare gate areas. The longer the distance that passengers are required to walk to exit the station, the more spread out the arrival surge becomes. The data presented in the report reflects a 1 to 2 minute arrival surge in cases when the distance from the midpoint of the platform to the planned fare gate area is less than or about equal to 200 feet, but only the 2 minute arrival surge when the distance is well over 200 feet.

   - To be consistent with all the prior queuing analysis and as directed by Metro, queuing analysis for Gold Line assumes the same number of trains for side and center platform as a worst case scenario. In case of Gold Line stations with center platform (Atlantic, Chinatown, Highland Park, and Indiana), queuing analysis assumes the worst case ridership/passengers arriving during 1-minute surge using 12 TPH/ 15% instead of 24 TPH and 7.5% factor. With this worst case approach, queuing analysis results could verify if the number of fare gates which could be accommodated at Atlantic, Chinatown, Highland Park, and Indiana based on station plans/architectural drawings are sufficient. For example, at any center platform station, with 100 peak hour passengers, 1-minute arrival surge would be 15 passengers with 12 TPH (15% of hourly passenger) and 7.5 ~ 8 passengers with 24 TPH (7.5% of hourly passenger). To consider the same peak percentage factor (15% instead of 7.5%) of hourly passengers

for 1-minute surge for center and side platform is evaluating the worst case fare gate capacity for the stations with center platform.

- Based on headway/TPH, it is assumed that 15% of total peak hourly passengers arrive during a 1-minute surge. **Table 6** below shows peak hour surge.

Line	Number of trains per peak hour	Headway (min.)	Peak percentage of total hourly passengers that arrive during a 1-minute surge
Regional Connector (LACMTA)	24	2.5	7.5%
Exposition 1 Line/ Blue Line (LACMTA)	12	5	15%
Red + Purple lines (LACMTA)	12	5	15%
Gold Line (LACMTA) – Atlantic/ Chinatown/ Highland Park/ Indiana/ Del Mar	**12**	**5**	**15%**
Green Line (LACMTA)	8	7.5	23%
Red Line (to North Hollywood) (LACMTA)	6	10	30%

Table 6: Peak Hour Surge

- Based on a previous system wide queuing study for PATH NY & NJ and discussions with LACMTA, a maximum queuing time of 55-seconds during surge has been considered as an acceptable service standard. A minimum number of fare gates were suggested based on keeping the 'maximum queuing time' below a 55 second service standard during the worst case scenario to achieve acceptable service standard. Metro has included 55 second as service standard in their design criteria.

- The level of service factor in the suggested 'Distance Required Behind the Gates' is provided based on the guideline by John J. Fruin Ph. D in the text *Pedestrian Planning and Design*. A Level of Service 'D' represents a pedestrian area occupancy of 3-7 square feet per person and an average inter-person spacing of 2-3 feet. Space is provided for standing without personal contact with others, but circulation through the queuing area is severely restricted and forward movement is only possible as a group. This level of area occupancy is not recommended for long-term periods of waiting, but may be acceptable in a metro station with a maximum 55 second wait.

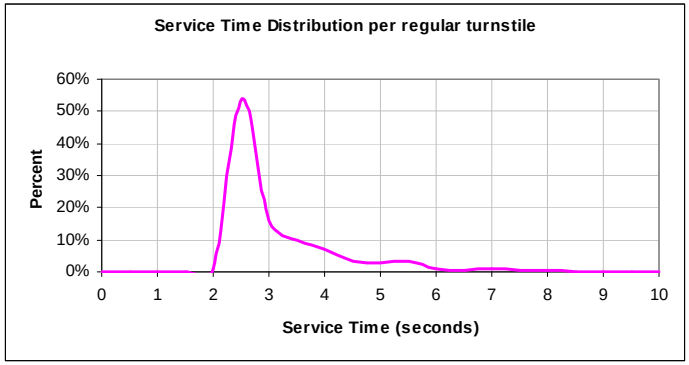
- **Surge Scenarios:** In order to capture variation in the service time of fare gates, the service time is assumed to have a chi-squared distribution ranging from 2 to 10 seconds for the worst case scenario and 1.7 to 4 seconds for the CUBIC estimated service scenario. The average service times used to predict the worst case scenario fluctuate around 3 seconds per person, while CUBIC estimates that the average service time is 2 seconds per person. Modeling with a higher service time enables the representation of a worst-case scenario during peak times and can account for the learning curve of riders using a new gating system.

Gold Line stations / Fare Gate Entrance Area (location)	Arrival Model		Delay Model			
	Surge (sec.)		Service Time		Worst Case Delay	
	Surge Scenario 1	Surge Scenario 2	Cubic Estimate (sec.)	Worst Case Estimate (sec.)	CUBIC Estimate (sec.)	Worst Case Estimate (sec.)
Atlantic East	60	120	2	3	1.7 to 4	2 to 10
Atlantic West	60	120	2	3	1.7 to 4	2 to 10
Chinatown North (elevator-only entrance)	60	120	2	3	1.7 to 4	2 to 10
Chinatown Mezzanine East Side	60	120	2	3	1.7 to 4	2 to 10
Chinatown Mezzanine West Side	60	120	2	3	1.7 to 4	2 to 10
Chinatown South	60	120	2	3	1.7 to 4	2 to 10
Highland Park East	60	120	2	3	1.7 to 4	2 to 10
Highland Park West	60	120	2	3	1.7 to 4	2 to 10
Indiana North	60	120	2	3	1.7 to 4	2 to 10
Indiana South	60	120	2	3	1.7 to 4	2 to 10
Del Mar East	60	120	2	3	1.7 to 4	2 to 10
Del Mar West	60	120	2	3	1.7 to 4	2 to 10

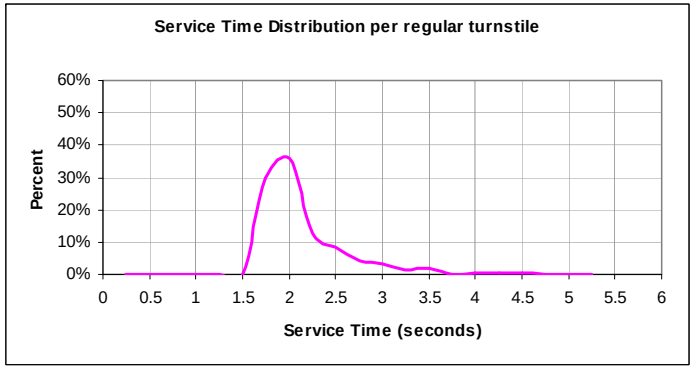
Table 7 – Surge Scenario Summary

The figures below represent the chi-squared distribution of the total amount of time it takes to get through a fare gate by the percentage of people who were serviced within that time.

Worst Case Scenario (3 second average service time)



Cubic Estimate Scenario (2 second average service time)



Results:

The following table describes the results presented in the conclusions for each station.

Field	Description
No. of Fare Gates	Number of turnstile and ADA fare gates in an array.
Surge Time (seconds)	The length of time between the first and the last person arriving at the turnstiles during a surge.
Maximum Wait (seconds)	The maximum time a person entering at the peak of the queue length would have to wait in the given scenario.
Maximum Number of Passengers in Queue	The expected maximum amount of people that will be delayed at the fare gates.
Maximum Queue Length Per Gate (feet)	The suggested queue space that would be needed behind each turnstile to accommodate people waiting in the queue, based on the maximum number of people in the queue.

LACMTA Gold Line Queuing Analysis - Assumptions and Input Data

Station Name/ Entrance	Platform Type	Worst Case Ridership (Year 2014): Peak of the Peak One Hour Passengers ON/OFF (Boardings and Alightings) as per Data provided by LACMTA Note 2	Year 2024 Ridership Projection (after applying ridership growth at all stations per Service Planning) - Peak of the Peak One Hour Passengers ON/OFF - Boardings/Alightings as per Data provided by Metro Note 2	Passengers per peak 1-2 minutes surge: 15% of peak one hour passengers during 1-minute surge 12 TPH/ 5-min headway Note 1	Gate Utilization Percentage (%)	1-minute surge based on gate utilization	Estimated Distance between Station Platform Midpoint and Planned Fare Gates (ft.) Note 4	*Scenario 1* Planned Number of Fare Gates based on Station Layout and Infrastructure Limitations (Turnstile and ADA Fare Gates) *Note 4 & 6*	*Scenario 2* Maximum number of fare gates required based on Equipment Quantity Analysis (EQA) *Note 6*	*Scenario 3* Minimum number of fare gates required to meet queuing design criteria Note 5 & 6
Atlantic - East	CENTER	397	568	85	70%	60	135	2	3	2
Atlantic - West	CENTER	397	568	85	70%	60	135	2	3	2
Chinatown - North (elevator-only)	MEZZANINE LEVEL to CENTER	353	558	84	30%	25	70	1	2	1
Chinatown - Mezzanine East Side		353	558	84	30%	25	105	2	2	1
Chinatown - Mezzanine West Side		353	558	84	70%	59	105	2	3	2
Chinatown - South		353	558	84	70%	59	150	2	3	2
Highland Park - East	CENTER	518	694	104	70%	73	225	1	4	2
Highland Park - West	CENTER	518	694	104	70%	73	160	2	4	2
Indiana - North	CENTER	274	367	55	70%	39	135	2	2	2
Indiana - South	CENTER	274	367	55	70%	39	135	2	2	2
Del Mar - East	SIDE	289	387	58	70%	41	135	2	2	2
Del Mar - West	SIDE	289	387	58	70%	41	140	2	2	2

Notes/ Assumptions:

Note 1: AM or PM Peak Period Headway: 5 min. headway/ 12 Trains Per Hour (TPH) as per LACMTA future operating plan.

Note 2: Year 2024 projected ridership growth for all the stations is based on Metro's email dated 3/25/15. Atlantic - 43%, Chinatown - 58%, Highland Park - 34%, Indiana - 34%, Del Mar - 34%

Note 3: Peak of the peak hour ridership is based on data provided for year 2014 by LACMTA (via email dated 01/12/15). Worst case peak hour ridership data (total of alightings and boardings) were used.

Note 4:
Station plan/ architectural drawings provided by LACMTA for Contracts 2000-02 and C0801.

Note 5: Queue Size Criteria: Bold red text indicates that station entrance has significant queues with passenger wait times greater than 55 seconds.
0 - No significant queues: wait times less than 5 sec. 1 - Slight queues: wait times between 5-30 sec.
2 - Noticeable queues: wait times between 30-55 sec. 3 - Significant queues: wait times greater than 55 sec.

Note 6: Scenario Description:
Scenario 1: Planned Number of Fare Gates based on Station Layout and Infrastructure Limitations (Turnstile and ADA Fare Gates)
Scenario 2: Max No. of fare gates required based on suggested Equipment Quantity Analysis (EQA)
Scenario 3: Min. No. of fare gates required to meet the queuing design criteria (wait times less than 55 sec.)

Table 8: Input Data

Gold Line Project stations / Gate entrance area	1-minute passenger surge based on gate utilization / (Percentage gate utilization for each station entrance)	Planned No. of fare gates station entrance can accommodate based on station plan and infrastructure limitations Scenario 1 Note 4	Max No. of fare gates required based on suggested EQA Scenario 2	Min. No. of fare gates required to meet the queuing design criteria (wait times less than 55 sec.) Scenario 3 Note 1 & 5	Maximum queue length - fare gates station entrance can accommodate based on station plan and infrastructure limitations (In linear ft.) Scenario 1 Note 4 & 6	Maximum queue length – fare gates required based on suggested EQA (In linear ft.) Scenario 2	Maximum queue length – minimum fare gates required to meet queuing design criteria (In linear ft.) Scenario 3 Note 1 & 5	Maximum Wait Times (Second)/Queue Size Type (see below the table)		
								Scenario No. 1 Note 5	Scenario No. 2 Note 5	Scenario No. 3 Note 5
Atlantic East	70%	2	3	2	24	8	24	32/ 2	17/ 1	32/ 2
Atlantic West	70%	2	3	2	24	8	24	32/ 2	17/ 1	32/ 2
Chinatown North (elevator-only)	30%	1	2	1	15	0	15	20/ 1	0/ 0	20/ 1
Chinatown Mezzanine East Side	30%	2	2	1	0	0	15	0/ 0	0/ 0	20/ 1
Chinatown Mezzanine West Side	70%	2	3	2	21	7	21	37/ 2	9/ 1	37/ 2
Chinatown South	70%	2	3	2	21	7	21	37/ 2	9/ 1	37/ 2
Highland Park East	70%	1	4	2	106	4	34	160/ 3	8/ 1	53/ 2
Highland Park West	70%	2	4	2	34	4	34	53/ 2	8/ 1	53/ 2
Indiana North	70%	2	2	2	6	6	6	9/ 1	9/ 1	9/ 1
Indiana South	70%	2	2	2	6	6	6	9/ 1	9/ 1	9/ 1
Del Mar East	70%	2	2	2	7	7	7	10/ 1	10/ 1	10/ 1
Del Mar West	70%	2	2	2	7	7	7	10/ 1	10/ 1	10/ 1

Note 1: Minimum number of fare gates required to meet queuing design criteria (passenger wait times greater than 55 seconds).
Note 2: AM or PM Peak Period Headway: 5 min. headway/ 12 Trains per Hour (TPH) as per LACMTA future operating plan.
Note 3: Peak of the peak hour ridership is based on data provided for year 2014 by LACMTA (via email dated 01/12/15). Worst case peak hour ridership data (total of alighting and boarding) were used.
Note 4: Station plan/ architectural drawings provided by LACMTA for Contracts 2000-02 and C0801.
Note 5: Queue Size Criteria: Bold red text indicates that station entrance has significant queues with passenger wait times greater than 55 seconds.
0 - No significant queues: wait times less than 5 sec. 1 - Slight queues: wait times between 5-30 sec.
2 - Noticeable queues: wait times between 30-55 sec. 3 - Significant queues: wait times greater than 55 sec.
Note 6: Bold red text indicates that maximum queue length (linear ft.) is more than the Distance between Station Platform Midpoint and Planned Fare Gate. This condition may create overcrowding on the platform due to significant queues with long passenger wait times and significant queue length behind the gates

Table 9: Results Summary

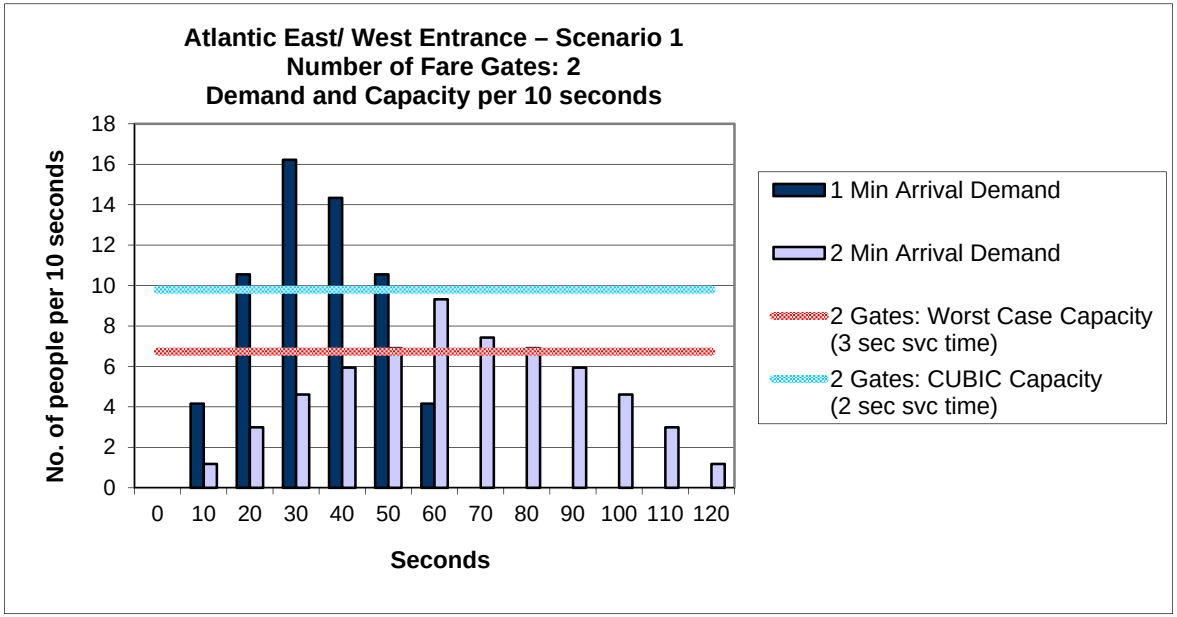
Metro Gold Line – Atlantic East/ West Entrance	
Passengers per Peak Surge (1-2 minutes)	**60** (70% of 85 passengers for 1-minute surge utilize **Atlantic East/ West** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	3
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Atlantic station includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in **Table 2**, for Atlantic station 43% of ridership growth is considered to calculate 2024 projected ridership.

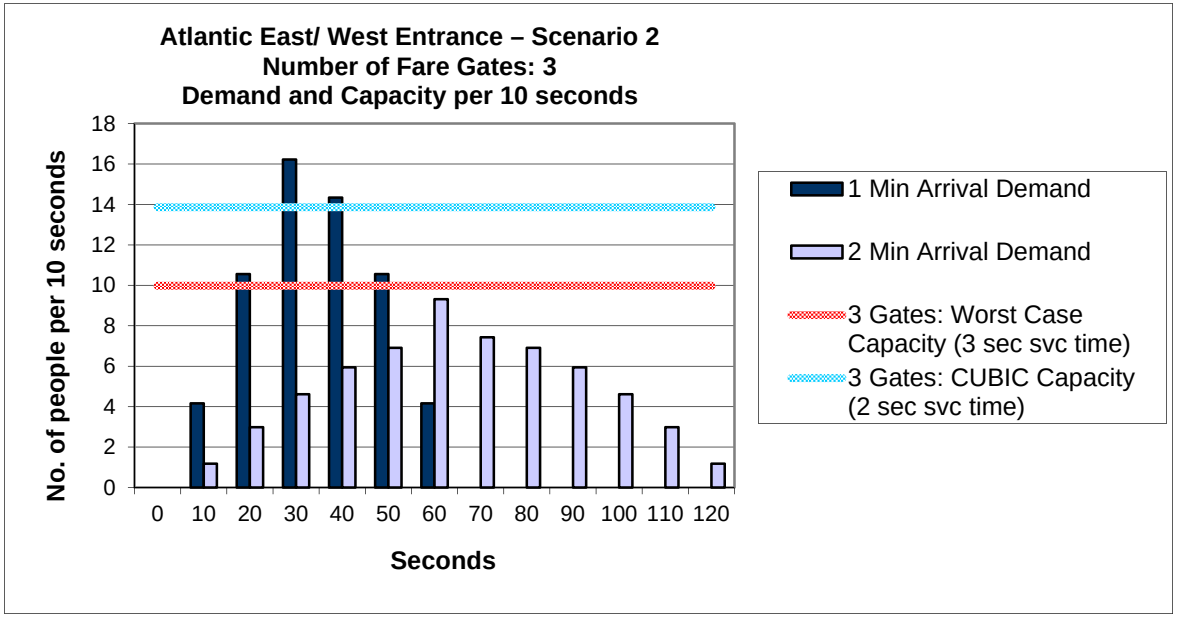
For Atlantic East/ West, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (154) and alighting (243) is 397 during year 2014. 43% ridership growth has been applied to 397 passengers to calculate year 2024 ridership projections at Atlantic (568 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at each Atlantic East/ West entrances. Therefore, **70**% of 1-minute passenger surge (**15**% **of 568** passengers = 85 passengers) utilize **Atlantic East/ West** station entrance fare gates. **70**% of 1-minute surge (85 passengers), **60** passengers utilize **Atlantic East/ West** station entrance fare gates. Refer to **Table 8** for details.

Results:

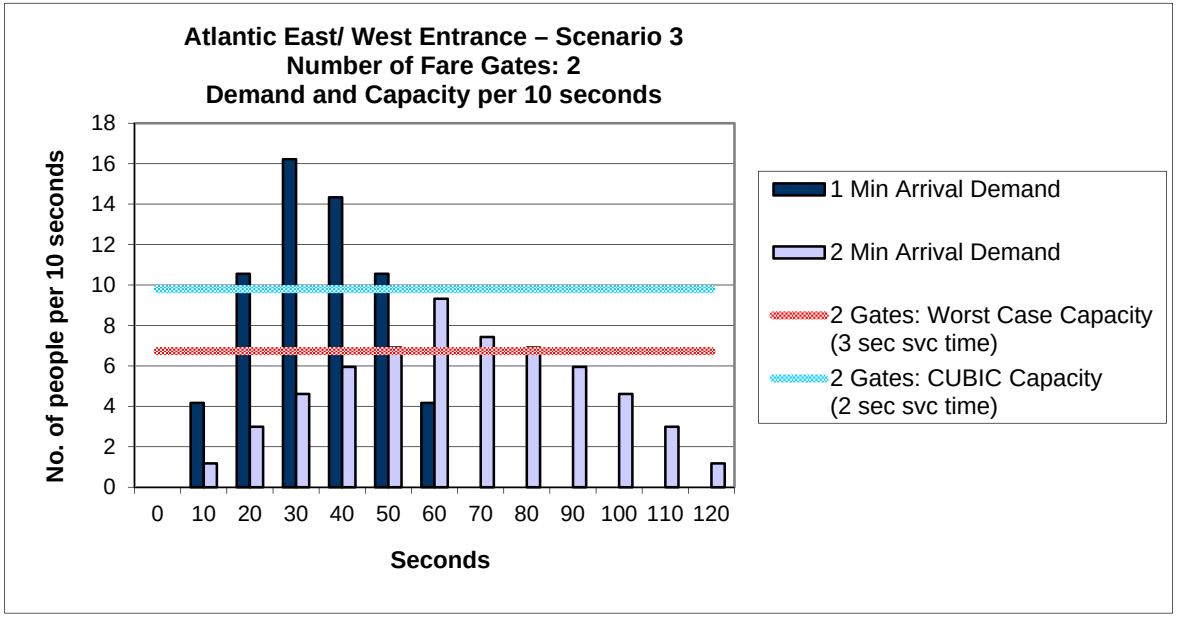
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 3



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Atlantic East/ West Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	32	24	24
2	Scenario 1 and 3	120	1	2	2
3	Scenario 2	60	17	12	8
3	Scenario 2	120	0	0	0

Metro Gold Line Atlantic East/ West Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	16	12	12
2	Scenario 1 and 3	120	0	0	0
3	Scenario 2	60	2	2	2
3	Scenario 2	120	0	0	0

Metro Gold Line – Atlantic East/ West Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 15 for reference:

  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 32 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Atlantic East/West** station entrance.

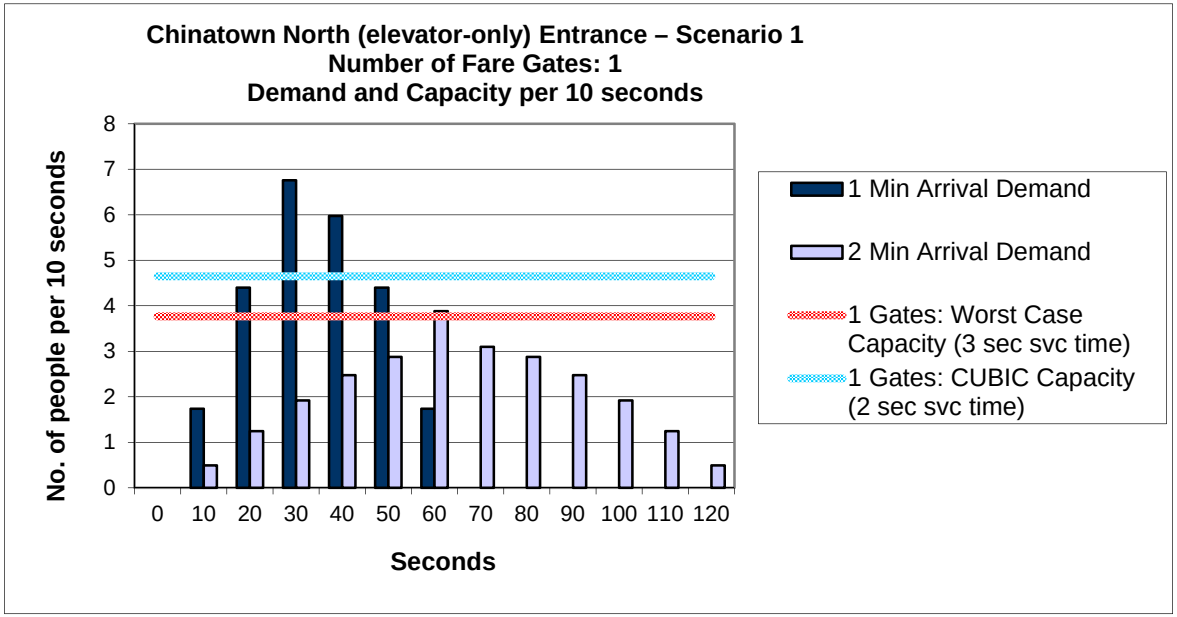
Metro Gold Line – Chinatown North (elevator-only) Entrance	
Passengers per Peak Surge (1-2 minutes)	**25** (30% of 84 passengers for 1-minute surge utilize **Chinatown North** (elevator-only) station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	1
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	2
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	1

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Chinatown North (elevator-only) entrance includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Chinatown North (elevator-only) entrance 58% of ridership growth is considered to calculate 2024 projected ridership.

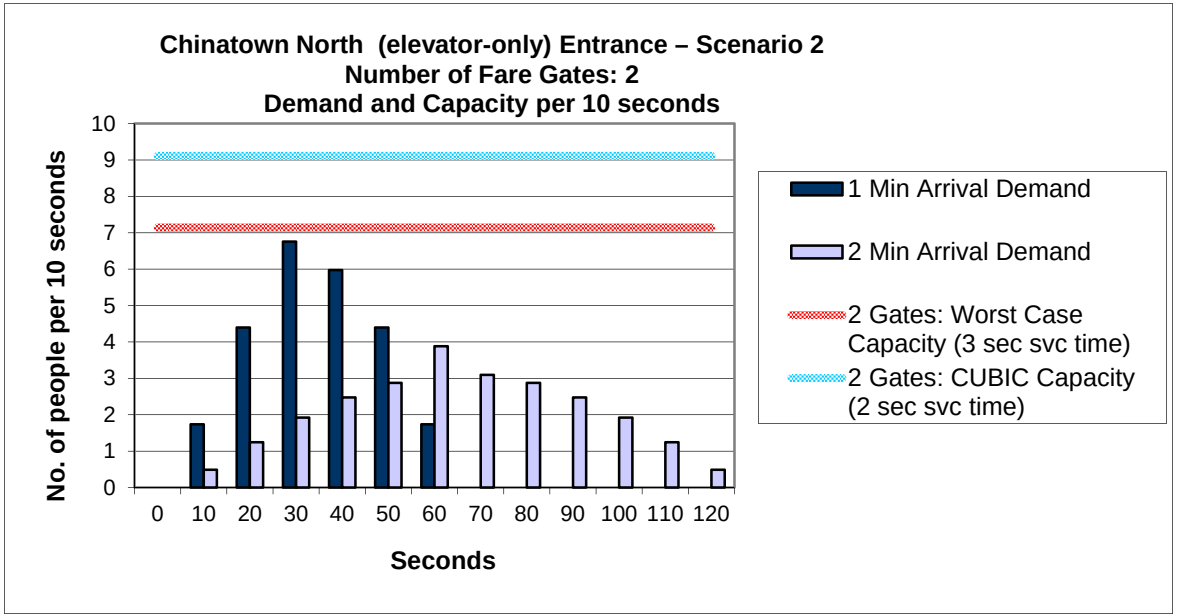
For Chinatown North (elevator-only) entrance, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (200) and alighting (153) is 353 during year 2014. 58% ridership growth has been applied to 353 passengers to calculate year 2024 ridership projections at Chinatown North (558 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 30% of gate utilization is assumed at Chinatown North (elevator-only) entrance. Therefore, **30**% of 1-minute passenger surge (**15**% **of 558** passengers = 84 passengers) utilize **Chinatown North (**elevator-only) station entrance fare gates. 30% of 1-minute surge (84 passengers), **25** passengers utilize **Chinatown North (**elevator-only) station entrance fare gates. Refer to **Table 8** for details.

Results:

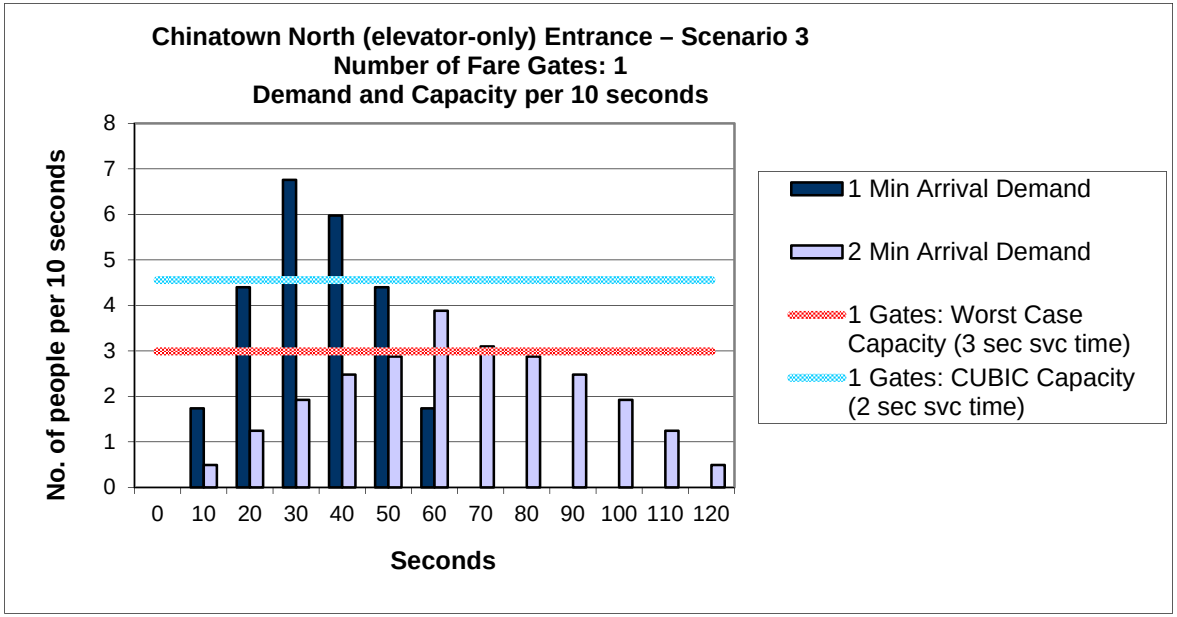
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 1



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 1



Metro Gold Line Chinatown North (elevator-only) Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
1	Scenario 1 and 3	60	20	8	15
1	Scenario 1 and 3	120	0	0	0
2	Scenario 2	60	0	0	0
2	Scenario 2	120	0	0	0

Metro Gold Line Chinatown North (elevator-only) Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
1	Scenario 1 and 3	60	8	3	6
1	Scenario 1 and 3	120	0	0	0
2	Scenario 2	60	0	0	0
2	Scenario 2	120	0	0	0

Metro Gold Line – Chinatown North (elevator-only) Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 21 for reference:

  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **one (1) fare gate** could have 20 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **one (1) fare** gate could be sufficient for **Chinatown North (elevator-only)** station entrance.

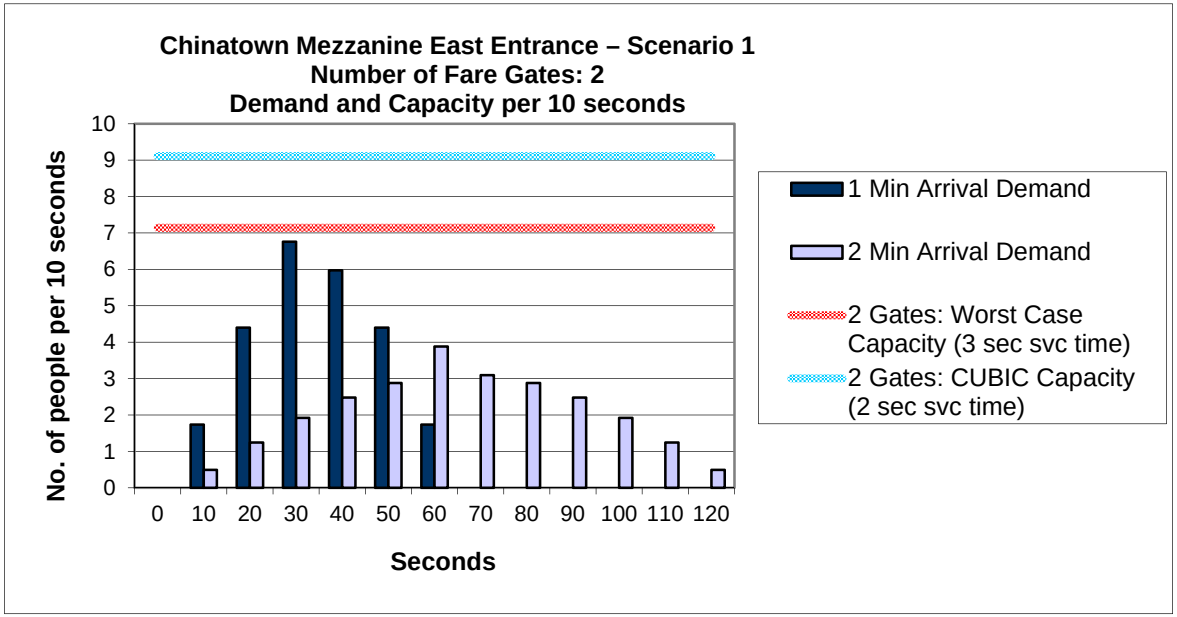
Metro Gold Line – Chinatown Mezzanine East Entrance	
Passengers per Peak Surge (1-2 minutes)	**25** (30% of 84 passengers for 1-minute surge utilize **Chinatown Mezzanine East** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	2
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	1

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Chinatown Mezzanine East entrance includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Chinatown Mezzanine East entrance 58% of ridership growth is considered to calculate 2024 projected ridership.

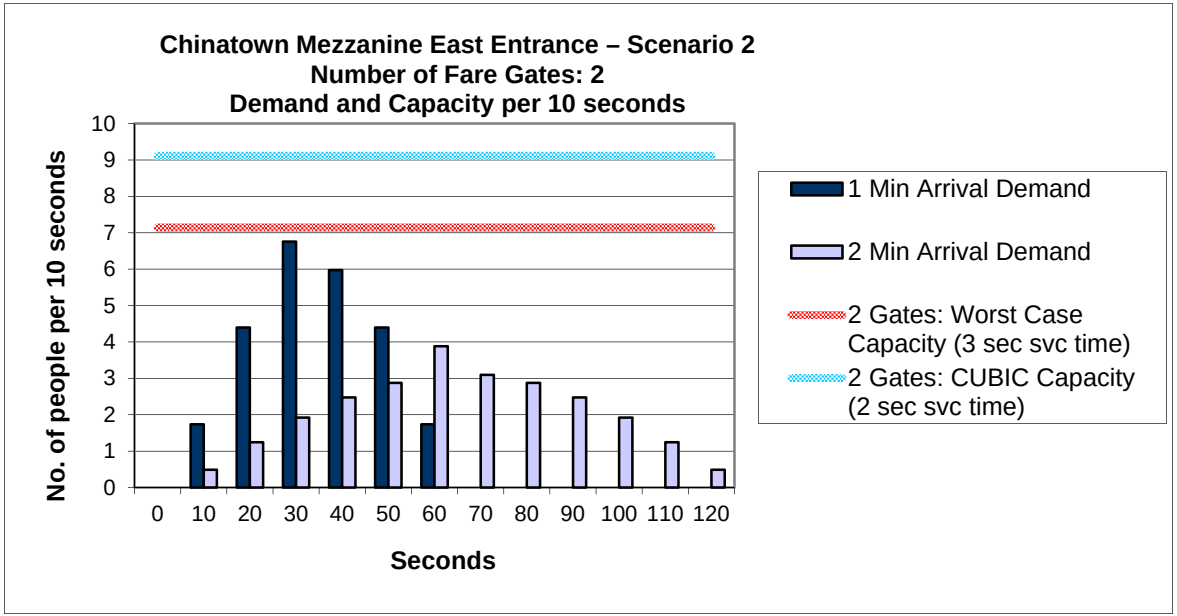
For Chinatown Mezzanine East, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (200) and alighting (153) is 353 during year 2014. 58% ridership growth has been applied to 353 passengers to calculate year 2024 ridership projections at Chinatown Mezzanine East (558 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 30% of gate utilization is assumed at Chinatown Mezzanine East entrance. Therefore, **30**% of 1-minute passenger surge (**15**% **of 558** passengers = 84 passengers) utilize **Chinatown Mezzanine East** station entrance fare gates. 30% of 1-minute surge (84 passengers), **25** passengers utilize **Chinatown Mezzanine East** station entrance fare gates. Refer to **Table 8** for details.

Results:

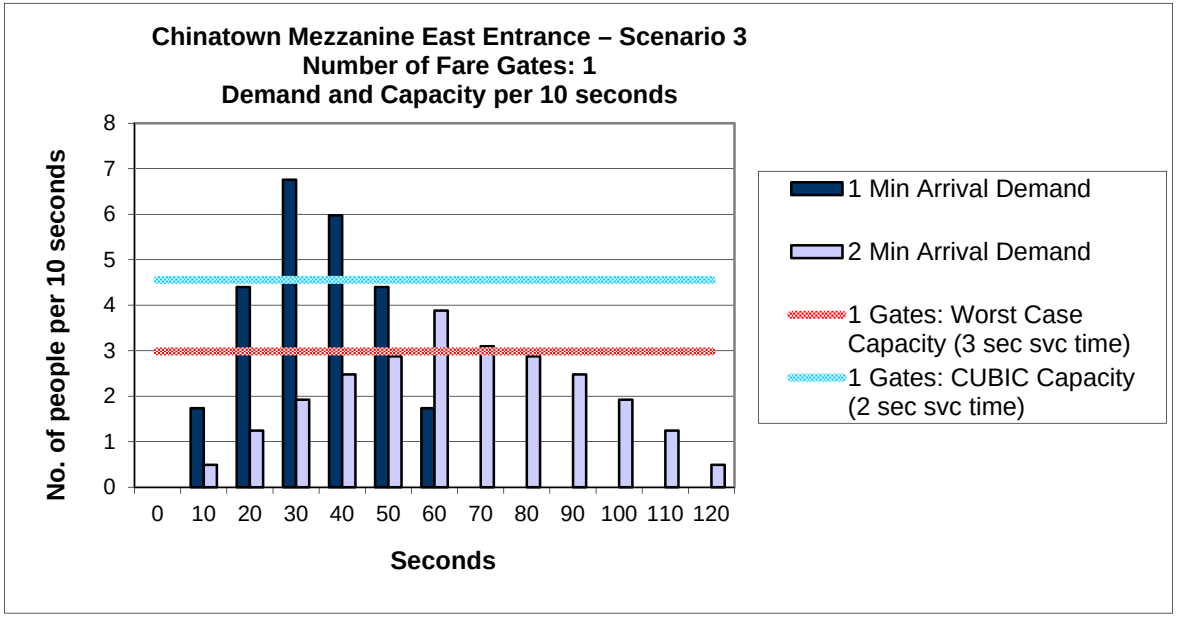
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 1



Metro Gold Line Chinatown Mezzanine East Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 2	60	0	0	0
2	Scenario 1 and 2	120	0	0	0
1	Scenario 3	60	20	8	15
1	Scenario 3	120	0	0	0

Metro Gold Line Chinatown Mezzanine East Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 2	60	0	0	0
2	Scenario 1 and 2	120	0	0	0
1	Scenario 3	60	8	3	6
1	Scenario 3	120	0	0	0

Metro Gold Line – Chinatown Mezzanine East Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 27 for reference:

  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **one (1) fare gate** could have 20 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **one (1) fare** gate could be sufficient for **Chinatown Mezzanine East** station entrance.

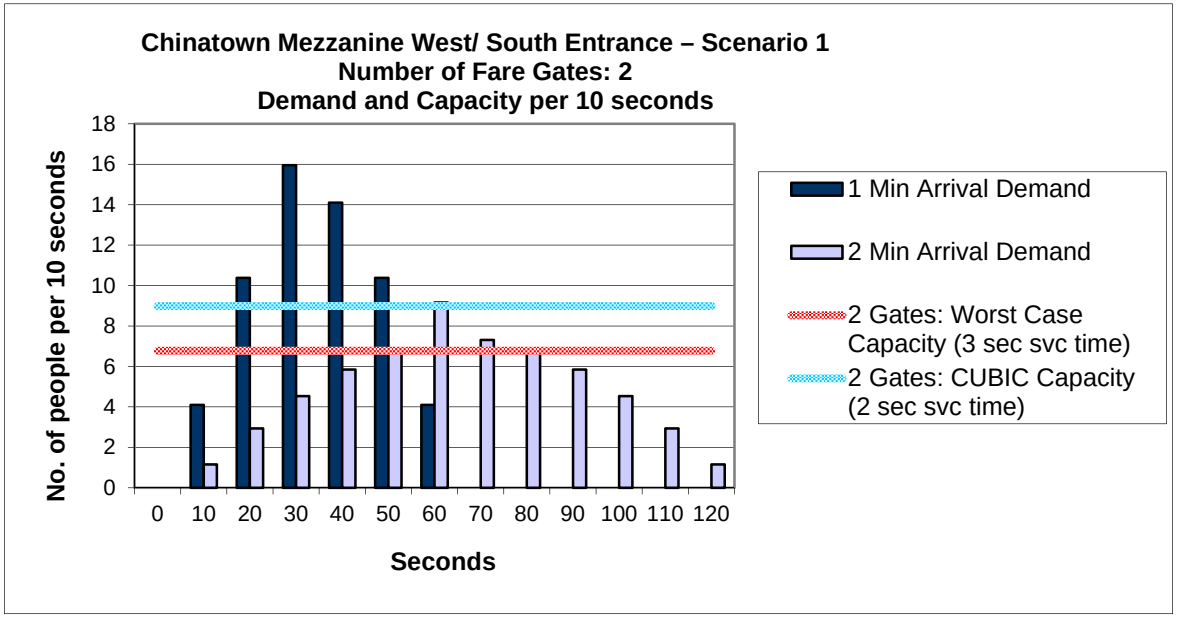
Metro Gold Line – Chinatown Mezzanine West/ South Entrance	
Passengers per Peak Surge (1-2 minutes)	**59** (70% of 84 passengers for 1-minute surge utilize **Chinatown Mezzanine West/ South** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	3
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Chinatown Mezzanine West/ South entrance includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Chinatown Mezzanine West/ South entrance 58% of ridership growth is considered to calculate 2024 projected ridership.

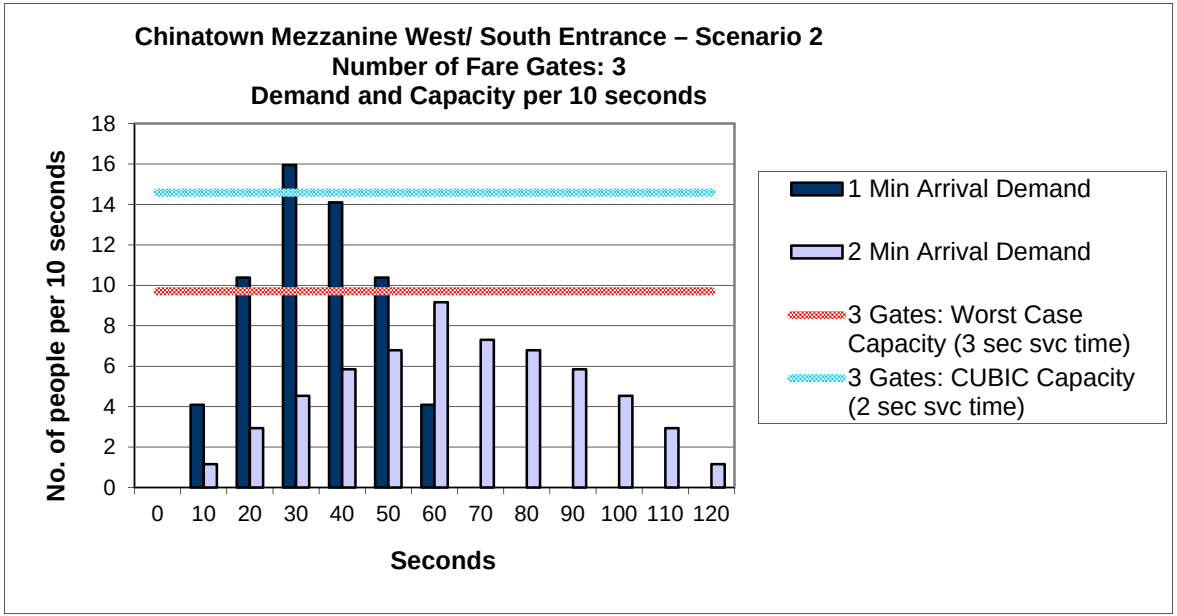
For Chinatown Mezzanine West/ South, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (200) and alighting (153) is 353 during year 2014. 58% ridership growth has been applied to 353 passengers to calculate year 2024 ridership projections at Chinatown Mezzanine West/ South (558 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at Chinatown Mezzanine West/ South entrance. Therefore, **70**% of 1-minute passenger surge (**15**% **of 558** passengers = 84 passengers) utilize **Chinatown Mezzanine West/ South** station entrance fare gates. 70% of 1-minute surge (84 passengers), **59** passengers utilize **Chinatown Mezzanine West/ South** station entrance fare gates. Refer to **Table 8** for details.

Results:

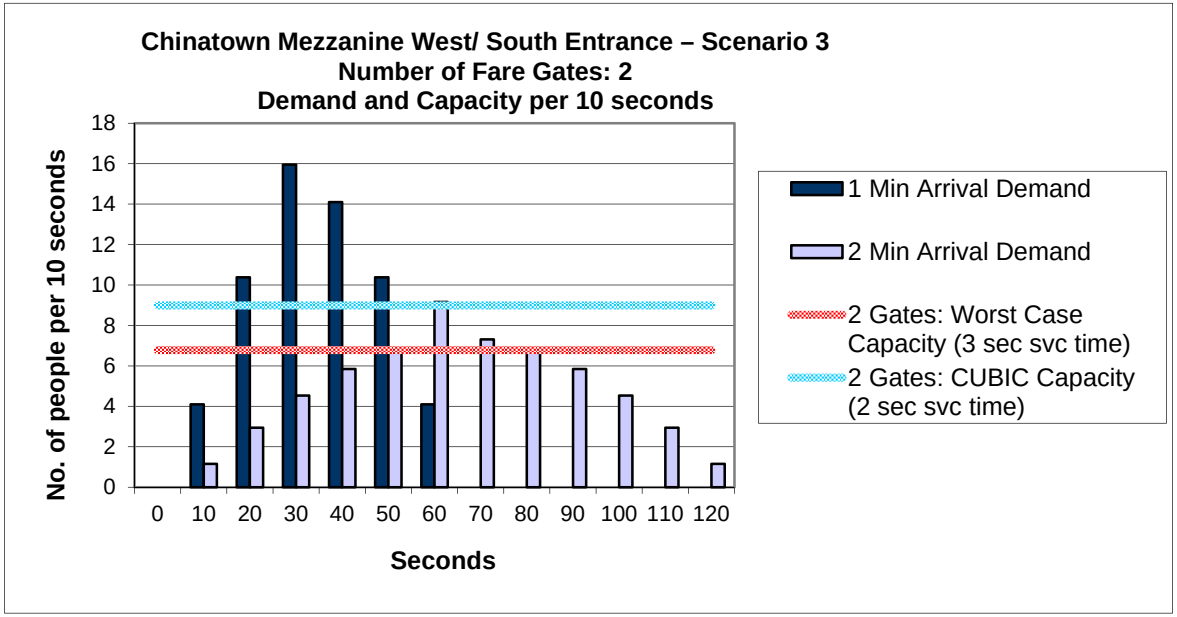
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 3



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Chinatown Mezzanine West/ South Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	37	21	21
2	Scenario 1 and 3	120	4	2	2
3	Scenario 2	60	9	10	7
3	Scenario 2	120	0	0	0

Metro Gold Line Chinatown Mezzanine West/ South Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	11	13	13
2	Scenario 1 and 3	120	0	0	0
3	Scenario 2	60	1	1	0
3	Scenario 2	120	0	0	0

Metro Gold Line – Chinatown Mezzanine West/ South Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 33 for reference:

  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 37 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Chinatown Mezzanine West/ South** station entrance

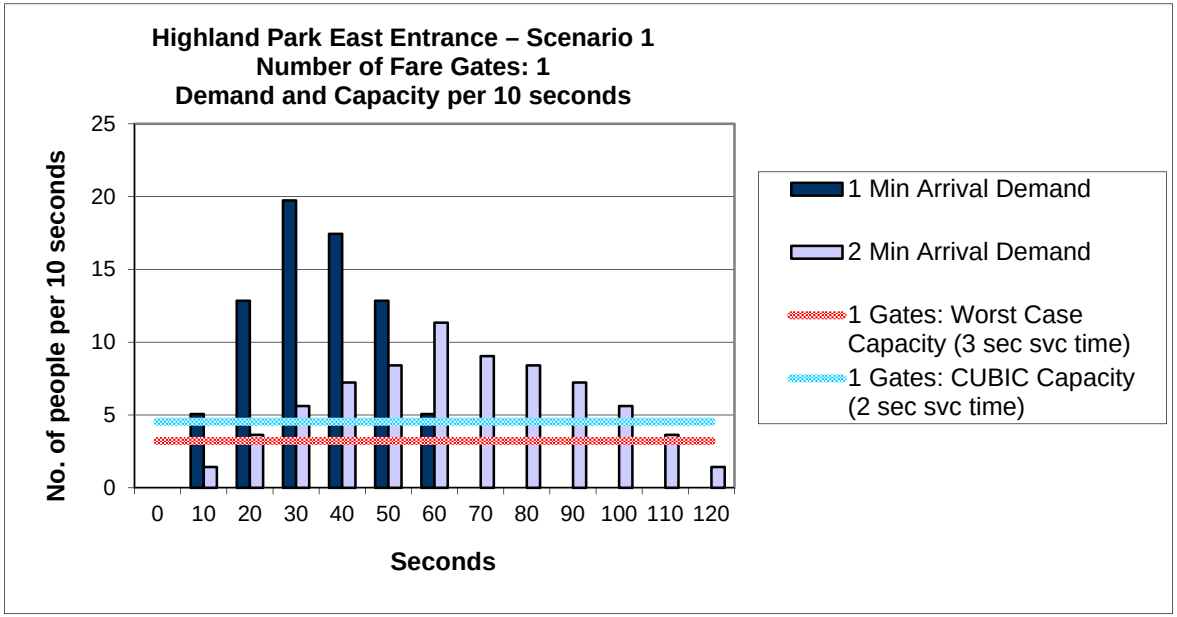
Metro Gold Line – Highland Park East Entrance	
Passengers per Peak Surge (1-2 minutes)	**73** (70% of 104 passengers for 1-minute surge utilize **Highland Park East** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	1
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	4
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Highland Park East includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Highland Park East entrance 34% of ridership growth is considered to calculate 2024 projected ridership.

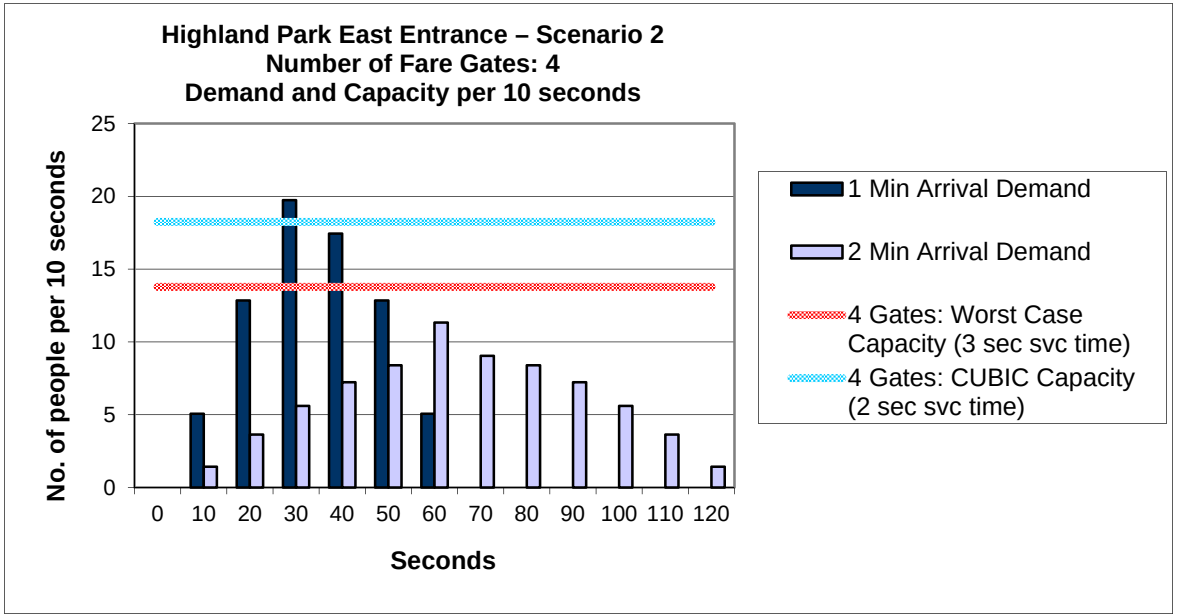
For Highland Park East, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (207) and alighting (311) is 518 during year 2014. 34% ridership growth has been applied to 518 passengers to calculate year 2024 ridership projections at Highland Park East (694 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at Highland Park East entrance. Therefore, **70%** of 1-minute passenger surge (**15% of 694** passengers = 104 passengers) utilize **Highland Park East** station entrance fare gates. 70% of 1-minute surge (104 passengers), **73** passengers utilize **Highland Park East** station entrance fare gates. Refer to **Table 8** for details.

Results:

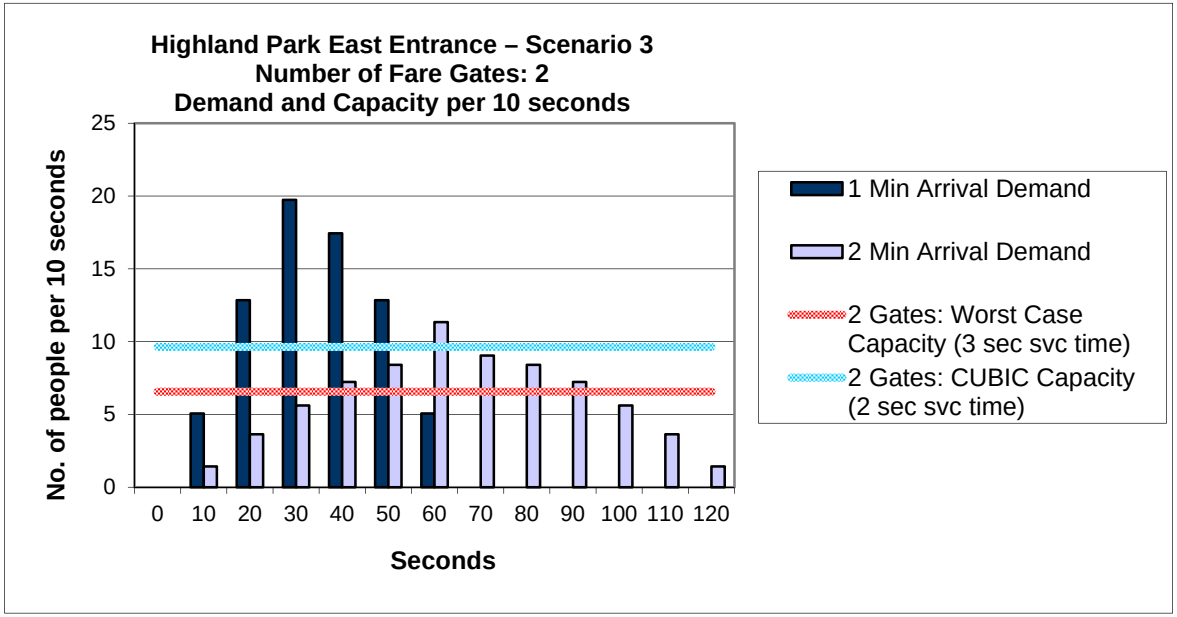
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 1



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 4



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Highland Park East Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
1	Scenario 1	60	**160**	53	106
1	Scenario 1	120	**97**	37	73
4	Scenario 2	60	8	8	4
4	Scenario 2	120	0	0	0
2	Scenario 3	60	53	34	34
2	Scenario 3	120	13	8	8

Metro Gold Line Highland Park East Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
1	Scenario 1	60	**97**	45	90
1	Scenario 1	120	**55**	25	51
4	Scenario 2	60	1	2	1
4	Scenario 2	120	0	0	0
2	Scenario 3	60	29	23	23
2	Scenario 3	120	2	1	1

Metro Gold Line – Highland Park East Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 39 for reference:

  - **Scenario 1** shows significant queues (maximum passenger wait time greater than 55 seconds) for 3 second and 2 seconds average service time during 1-minute and 2-minute surge.

  - **Scenarios 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 53 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Highland Park East** station entrance.

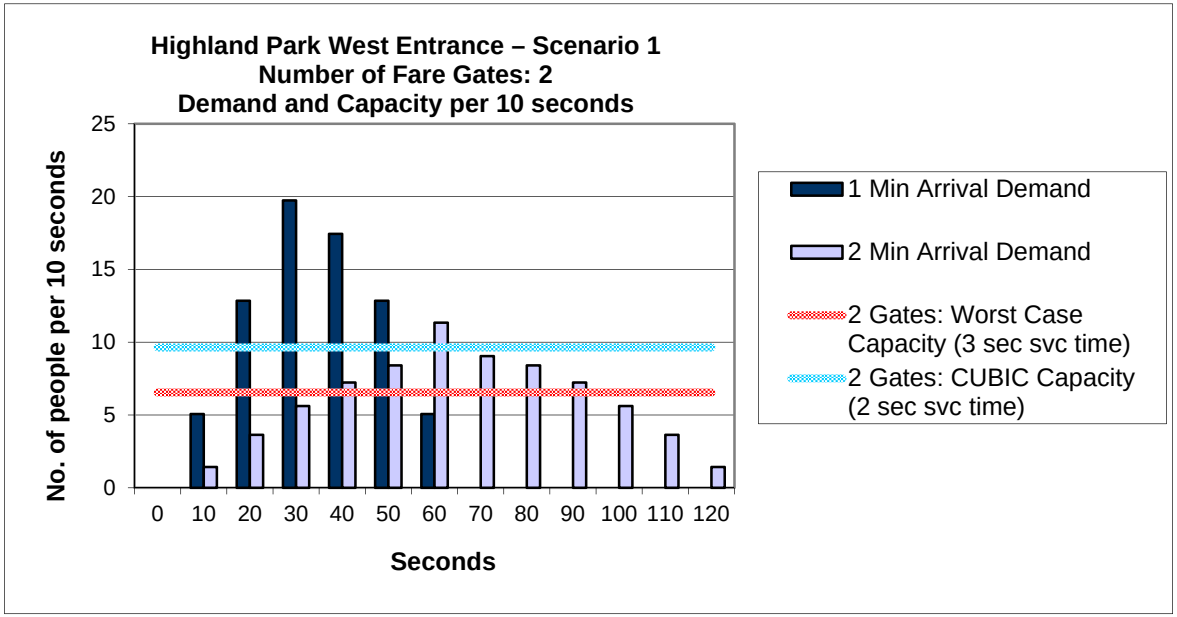
Metro Gold Line – Highland Park West Entrance	
Passengers per Peak Surge (1-2 minutes)	**73** (70% of 104 passengers for 1-minute surge utilize **Highland Park West** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	4
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Highland Park West includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Highland Park West entrance 34% of ridership growth is considered to calculate 2024 projected ridership.

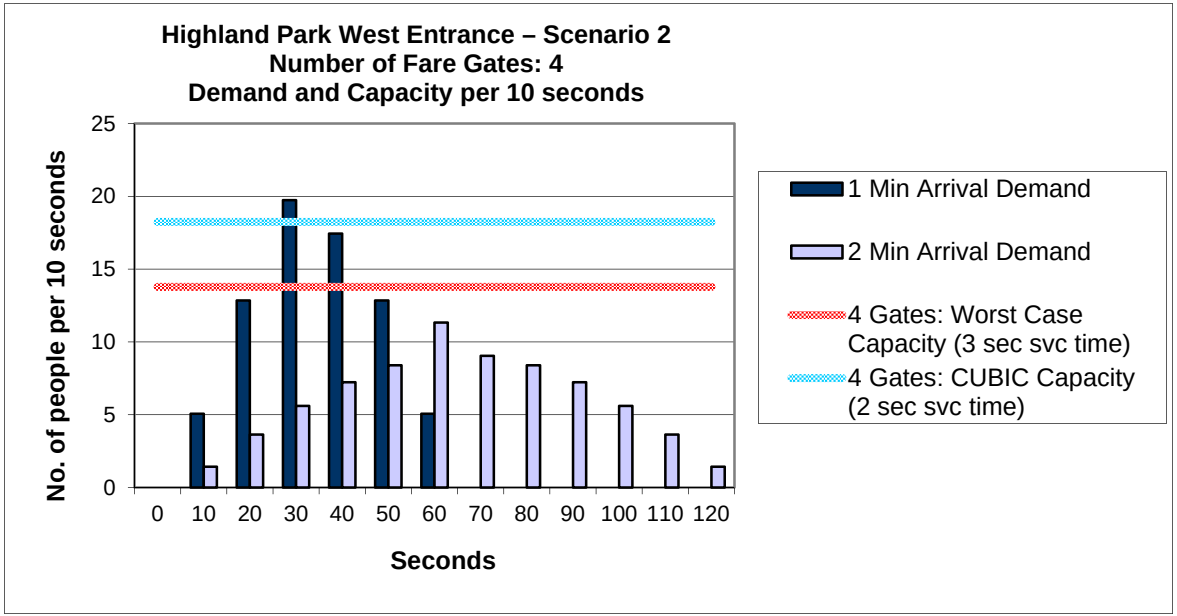
For Highland Park West, maximum total peak of the peak hour (5pm to 6pm) passenger boarding (207) and alighting (311) is 518 during year 2014. 34% ridership growth has been applied to 518 passengers to calculate year 2024 ridership projections at Highland Park West (694 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at Highland Park West entrance. Therefore, **70**% of 1-minute passenger surge (**15**% **of 694** passengers = 104 passengers) utilize **Highland Park West** station entrance fare gates. 70% of 1-minute surge (104 passengers), **73** passengers utilize **Highland Park West** station entrance fare gates. Refer to **Table 8** for details.

Results:

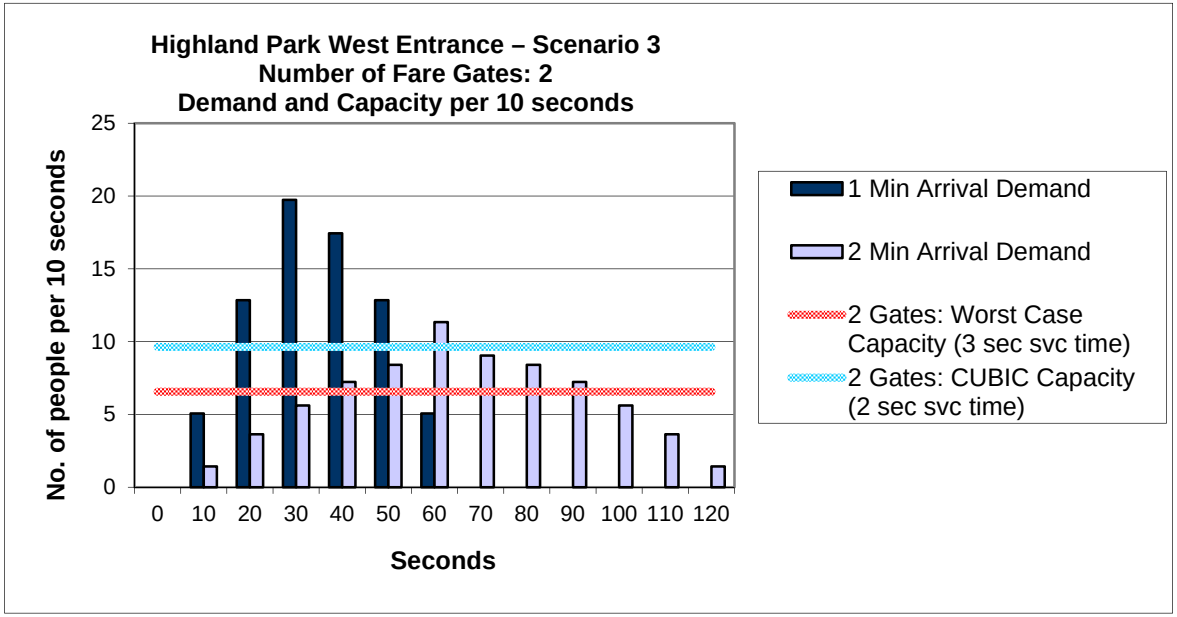
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 4



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Highland Park West Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	53	34	34
2	Scenario 1 and 3	120	13	8	8
4	Scenario 2	60	8	8	4
4	Scenario 2	120	0	0	0

Metro Gold Line Highland Park West Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1 and 3	60	29	23	23
2	Scenario 1 and 3	120	2	1	1
4	Scenario 2	60	1	2	1
4	Scenario 2	120	0	0	0

Metro Gold Line – Highland Park West Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables on page 45 for reference:

  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).

  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 53 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Highland Park West** station entrance.

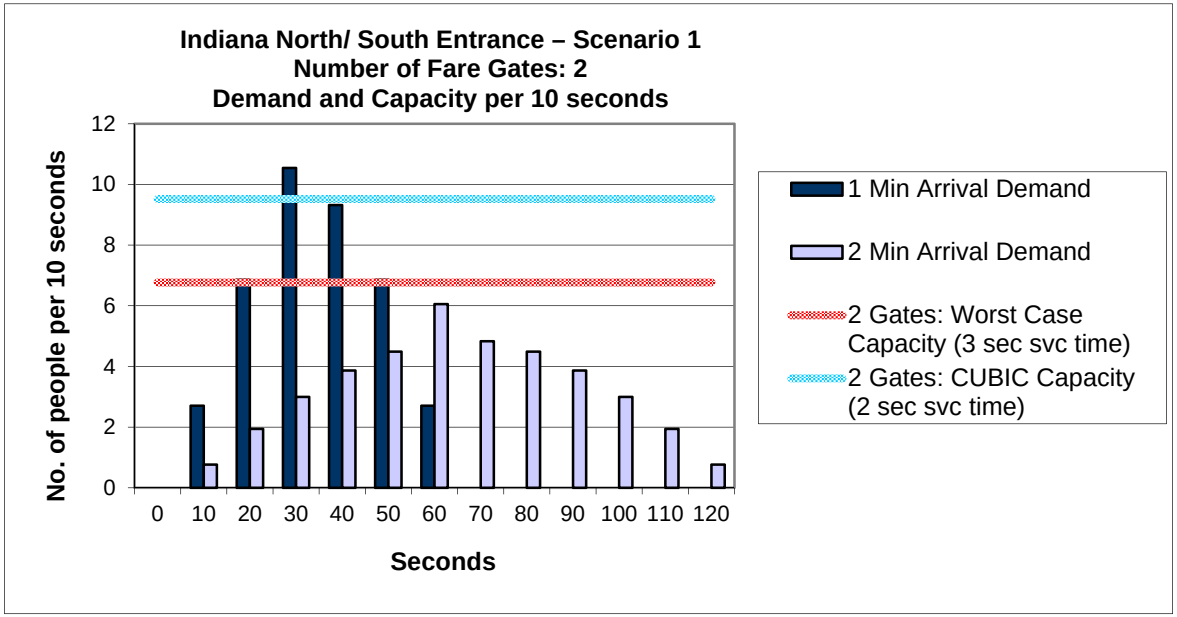
Metro Gold Line – Indiana North/ South Entrance	
Passengers per Peak Surge (1-2 minutes)	**39** (70% of 55 passengers for 1-minute surge utilize **Indiana North/ South** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	2
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Indiana North/ South includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Indiana North/ South entrance 34% of ridership growth is considered to calculate 2024 projected ridership.

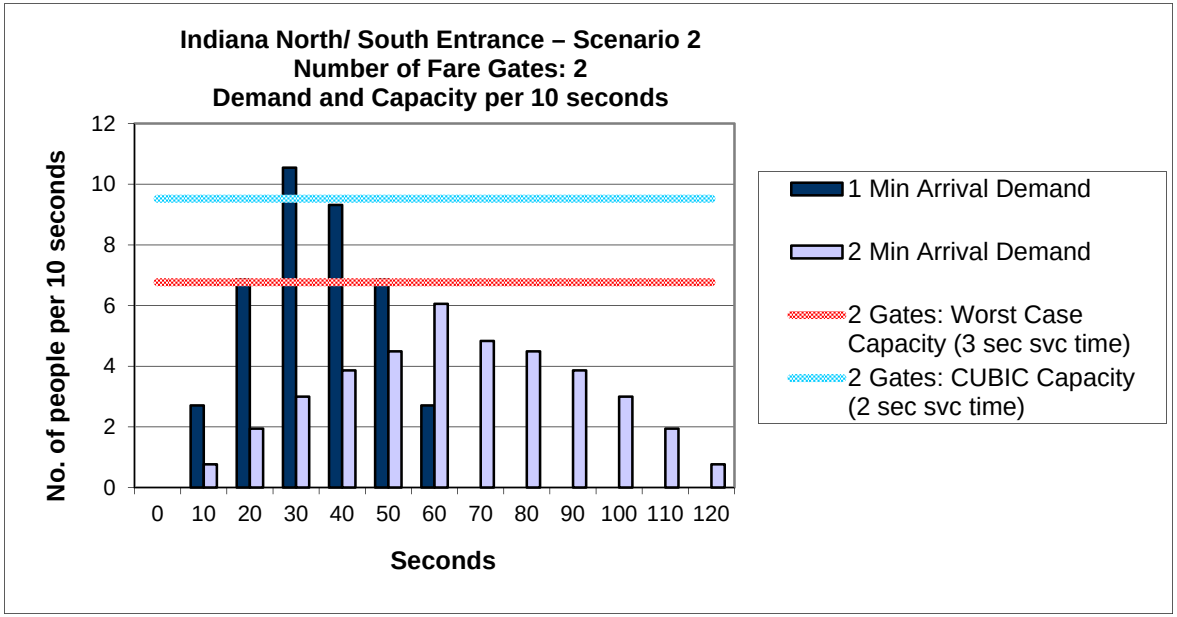
For Indiana North/ South, maximum total peak of the peak hour (3pm to 4pm) passenger boarding (115) and alighting (159) is 274 during year 2014. 34% ridership growth has been applied to 274 passengers to calculate year 2024 ridership projections at Indiana North/ South (367 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at Indiana North/ South entrance. Therefore, **70%** of 1-minute passenger surge (**15% of 367** passengers = 55 passengers) utilize **Indiana North/ South** station entrance fare gates. 70% of 1-minute surge (55 passengers), **39** passengers utilize **Indiana North/ South** station entrance fare gates. Refer to **Table 8** for details.

Results:

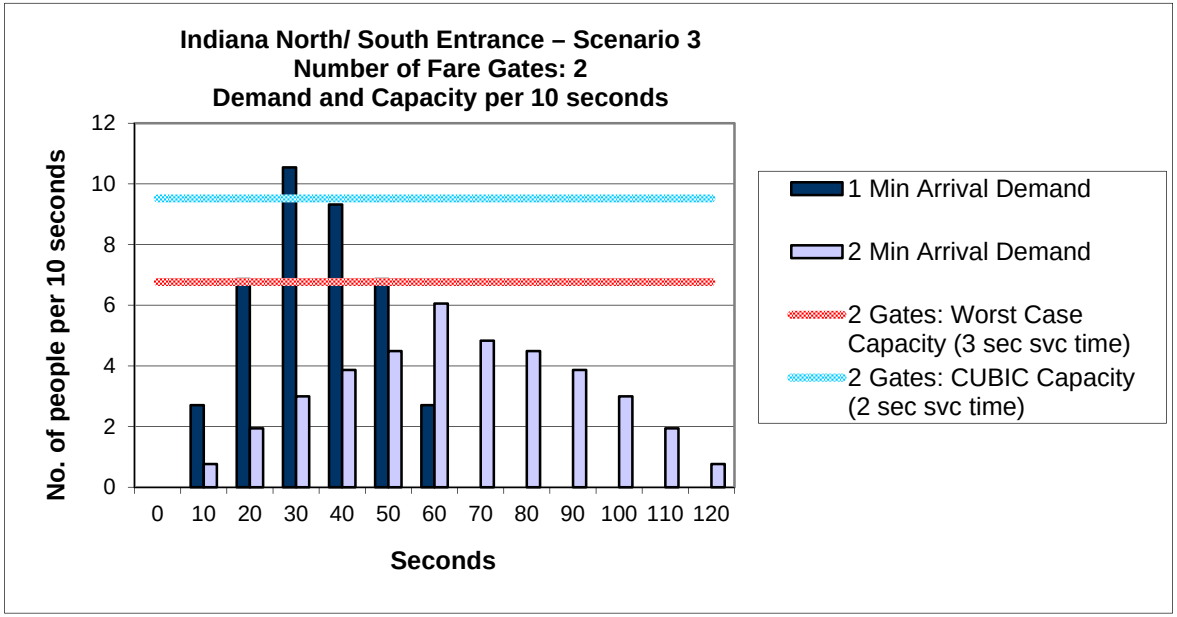
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Indiana North/ South Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1, 2 and 3	60	9	6	6
2	Scenario 1, 2 and 3	120	2	0	0

Metro Gold Line Indiana North/ South Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1, 2 and 3	60	2	2	2
2	Scenario 1, 2 and 3	120	0	0	0

Metro Gold Line – Indiana North/ South Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables above for reference:
  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).
  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 9 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Indiana North/ South** station entrance.

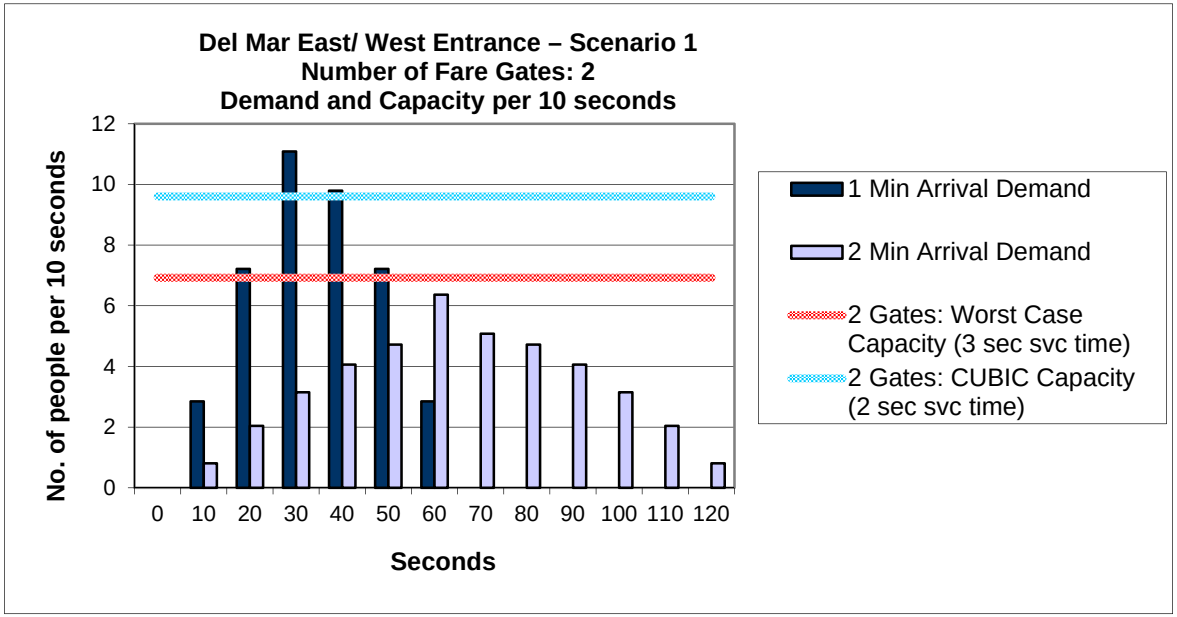
Metro Gold Line – Del Mar East/ West Entrance	
Passengers per Peak Surge (1-2 minutes)	**41** (70% of 58 passengers for 1-minute surge utilize **Del Mar East/ West** station entrance fare gates)
Scenario 1 - Planned number of fare gates station entrance can accommodate based on station plan and infrastructure limitations	2
Scenario 2 - Maximum number of fare gates based on suggested Equipment Quantity Analysis (EQA)	2
Scenario 3 - Minimum number of fare gates required to meet queuing design criteria (wait times less than 55 sec.)	2

Station assumptions:
Ridership demand is modeled based on year 2024 peak hour ridership projections. A demand model has been created to estimate the amount of passengers each station must service during a peak surge that lasts one or two minutes long. Peak of the peak hour ridership for Del Mar East/ West includes maximum total of peak hour passenger boarding and alighting for year 2014. As indicated in Table 2, for Del Mar East/ West entrance 34% of ridership growth is considered to calculate 2024 projected ridership.

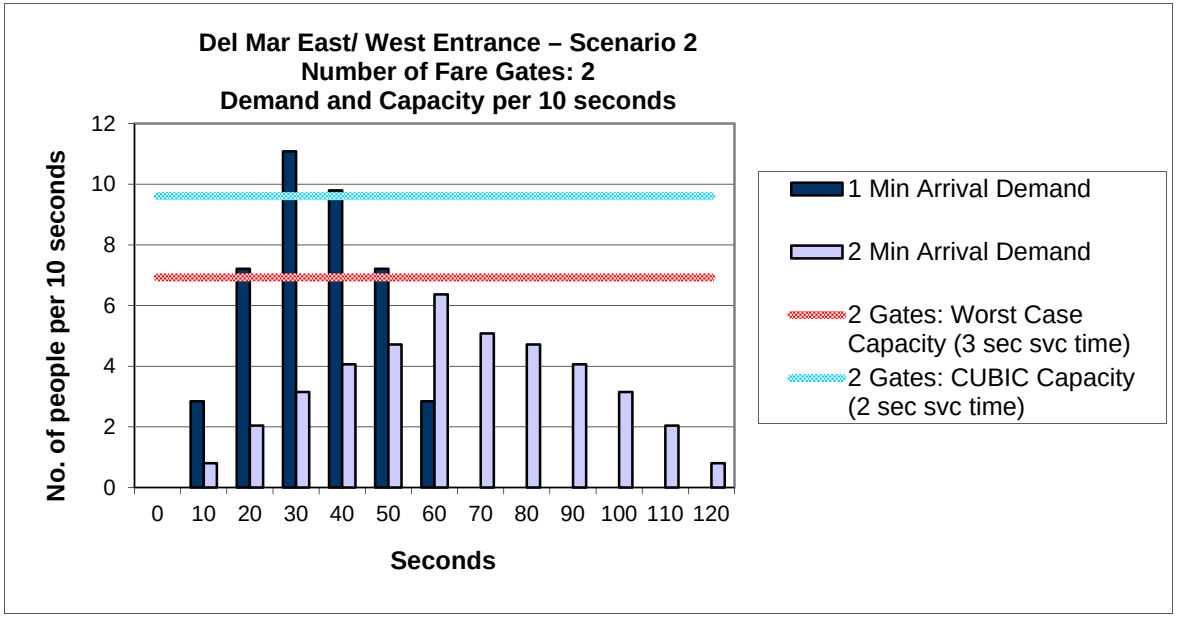
For Del Mar East/ West, maximum total peak of the peak hour (6pm to 7pm) passenger boarding (108) and alighting (181) is 289 during year 2014. 34% ridership growth has been applied to 289 passengers to calculate year 2024 ridership projections at Del Mar East/ West (387 passengers). Based on 12 Trains per Hour (TPH)/ 5 minute headway, it is assumed (as per Table 6) that 15% of peak one hour surge go through the fare gates during 1-minute surge. 70% of gate utilization is assumed at Del Mar East/ West entrance. Therefore, **70**% of 1-minute passenger surge (**15% of 387** passengers = 58 passengers) utilize **Del Mar East/ West** station entrance fare gates. 70% of 1-minute surge (58 passengers), **41** passengers utilize **Del Mar East/ West** station entrance fare gates. Refer to **Table 8** for details.

Results:

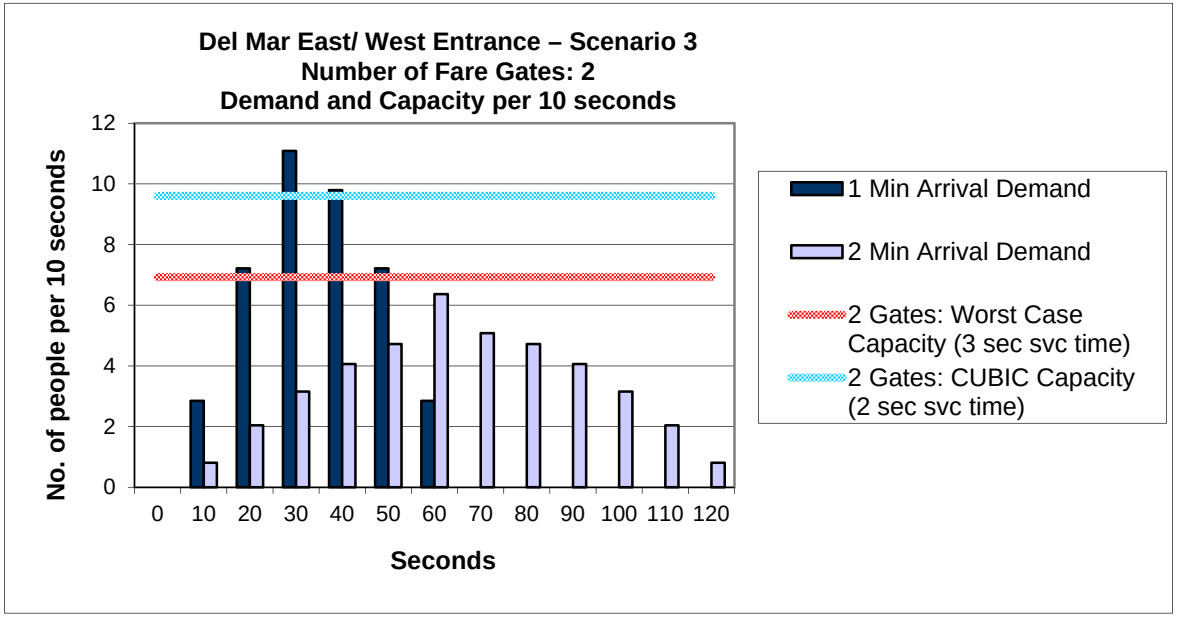
Scenario 1 – Planned number of fare gates station entrance can accommodate based on station plan drawings and infrastructure limitations / Number of Fare Gates: 2



Scenario 2 – Maximum Number of fare gates based on suggested Equipment Quantity Analysis (EQA) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Scenario 3 – Minimum number of fare gates required to meet queuing design criteria (wait time less than 55 seconds) with 1-2 minute arrival surge/ Number of Fare Gates: 2



Metro Gold Line Del Mar East/ West Station Entrance - Worst Case (3 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1, 2 and 3	60	10	7	7
2	Scenario 1, 2 and 3	120	0	0	0

Metro Gold Line Del Mar East/ West Station Entrance - CUBIC Estimate (2 second average service time)					
No. of Fare Gates	**Scenarios**	**Surge Time (seconds)**	**Maximum Wait (seconds)**	**Maximum Number of People in Queue**	**Maximum Queue Length Per Gate (feet)**
2	Scenario 1, 2 and 3	60	2	1	1
2	Scenario 1, 2 and 3	120	0	0	0

Metro Gold Line – Del Mar East/ West Station Entrance Conclusions:

- Based on demand (2024 ridership projections and 1-2 minute surge) and station assumptions, summary of the model results. See tables above for reference:
  - **Scenarios 1, 2 and 3** do not show significant queues for 2 second and 3 second average service time. **Scenarios 1, 2 and 3** as specified above, maximum passengers wait time is less than 55 seconds (a maximum queuing time of 55-seconds during surge has been considered an acceptable service standard).
  - Per 2024 peak hour ridership projections, model iterations suggest that installing minimum **two (2) fare gates** could have 10 **seconds of maximum passenger wait time** (less than 55 seconds of design criteria for significant queues) and therefore **two (2) fare** gates could be sufficient for **Del Mar East/ West** station entrance.

Appendix

- **04/01/15 email from Metro with input on Station layout and platform length and distance between midpoint of platform and planned fare gate locations**

Station Layout and distances assumptio

- **04/07/2015 email from Metro confirming assumptions and Input including projected ridership growth for 2024 ridership**

LACMTA Assumptions Riders

Parikh, Anip/NJO

From: Wasz, Gregory <WaszG@metro.net>
Sent: Wednesday, April 01, 2015 7:49 PM
To: Parikh, Anip/NJO; Preusser, Patrick
Cc: Simon, John/LAC; Comps, Pete/CHC; Arteaga, Mauro; Chu, Chaushie
Subject: RE: LACMTA - Gold Line Queuing Analysis Assumptions/Input Review
Attachments: MGL Fare Gates TVM's & Map Cases_Highland Park_West & East_100914.pdf; Gold-ChinatownDwgExtr.pdf

Anip,

As follow-up to our meeting discussion today:

- In regard to Highland station, attached is the mark-up drawing for proposed gated entrance at the East end of the station, which includes a single ADA fare gate aisle. As noted during the meeting, please disregard the arrangement shown on the West end of the station which an earlier revision

.

- In regard to Chinatown station, attached is scan of a few dimensioned Architectural drawings of the platform, mezzanine, and street levels to give you an idea of the distances involved from the mid-point of the platform to locations of each of the fare gate arrays that are reflected in the separate mark-ups for this station. As discussed, the horizontal distances from midpoint of platform are approx. 70 ft to the location of the proposed elevator fare barrier on the North Plaza; approx. 105 ft to the either of the two proposed are barriers on the mezzanine level; and approx. 150 feet to the proposed fare barrier at South end of platform over the South Plaza.

- In regard to Highland Park the distances from midpoint of platform to the proposed location of the East Entrance Fare barrier is approx. 225 ft

- In regard to Del Mar, the distance from midpoint of the East (EB) Platform is approx. 135 ft to the proposed fare barrier location; and from midpoint of the West (WB) Platform is approx. 140 ft, to the proposed fare barrier location

Hope that this helps clarify,

Thanks,

Parikh, Anip/NJO

From: Preusser, Patrick <PreusserP@metro.net>
Sent: Tuesday, April 07, 2015 6:14 PM
To: Parikh, Anip/NJO; Wasz, Gregory
Cc: Simon, John/LAC; Arteaga, Mauro; Chu, Chaushie; Li, Janice/NYC
Subject: RE: LACMTA - Gold Line Queuing Analysis Assumptions/Input Review

Hi Anip,

I apologize for the delay. Please use the following gate utilization assumptions at Chinatown:

1. South end of Platform – 70%
2. West side Mezzanine - 70%
3. East side Mezzanine - 30%
4. North Plaza (Elevator-Only) – 30%

Thanks,

Patrick Preusser
Deputy Executive Officer, Rail Operations
Los Angeles County Metropolitan Transportation Authority
☎ 213.922.7974 | ☎ 213.842.5936 (mobile) | ✉ preusserp@metro.net | http://www.metro.net/
Vision: *Safe, clean, reliable, on-time, courteous service dedicated to providing Los Angeles County with a world class transportation system.*

From: Anip.Parikh@ch2m.com [mailto:Anip.Parikh@ch2m.com]
Sent: Monday, April 06, 2015 7:03 AM
To: Wasz, Gregory; Preusser, Patrick
Cc: John.Simon@ch2m.com; Arteaga, Mauro; Chu, Chaushie; Janice.Li@ch2m.com
Subject: RE: LACMTA - Gold Line Queuing Analysis Assumptions/Input Review
Importance: High

Greg and Patrick,

Please see below revised assumptions/ input table for Gold Line Queuing Analysis. Table has been revised per our discussion last Wednesday and it is consistent with Greg's email below:

Text marked in red for Chinatown in the table below is yet to be confirmed by Metro. As discussed, Metro will discuss internally and provide the percentage passenger distribution at Chinatown. For example, at Rosa Parks (Blue Line), Metro Operations and Service