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OPERATIONS COMMITTEE
JUNE 19, 2008

PROJECT: RAIL DIVISION CAPACITY ASSESSMENT REPORT

ACTION: RECEIVE AND FILE

RECOMMENDATION

Receive and file this report summarizing the assessment on Light Rail division capacity.

ISSUE

The ability to increase Rail Service is dependent upon a much larger fleet of Light Rail Vehicles and the availability of adequate facilities to store and maintain them. Currently, our storage and maintenance yards are reaching their capacity and are not able to accommodate enough new vehicles to support any significant increases in service. To ensure we can meet the increasing ridership demands, we must take swift and meaningful action to secure maintenance and storage facility sites to support a fleet that will grow by approximately 200% over the next 22 years.

DISCUSSION

In order for us to meet the growing Light Rail Transit (LRT) ridership demands in Los Angeles County a significantly larger Light Rail fleet is required. The Long Range Transportation Plan (LRTP) proposes a systemwide five minute headway service level in 2030. By 2030, 390 light rail vehicles could be in service, which is an increase of 269 vehicles over the current fleet of 121 vehicles in operations today. Between 2008 and 2016, however, the fleet will more than double to a total of 245 vehicles as 124 new vehicles are added to meet the ridership projections and support the operations requirements when the Exposition and Eastside lines are activated. The storage and maintenance capacity does not exist today to support either the 2016 or the 2030 light rail fleet.

We should now commence several activities to develop the maintenance and storage capacity that is needed to support the Light Rail System. These activities include identifying potential sites for these facilities, preparing facilities plans and other related steps. The process that

will result in provision of the increased capacity should begin before other new lines are activated and existing lines are extended. One way to help accomplish this is to ensure the availability of funds for use to develop the new yards. The second activity is to begin the process of environmentally clearing appropriate sites. This will ensure the needed facilities are activated in time to support the fleet and maintain its reliability to meet public demand for light rail transit service.

While the provision of some of the required new capacity has been funded in the individual rail lines, development of these facilities has been hampered by difficulties in identifying suitable sites that will meet current and projected needs. Additionally, changes in the Federal Transit Administration's (FTAs) funding criteria reduced potential federal funding for maintenance facility development to support only the vehicles required for project ridership projections based on the first ten years of revenue service. While early rail planning efforts recognized the need for larger facilities, this FTA funding criteria change has influenced our decisions to defer development of these facilities until the later years of the LRTP.

The draft 2008 LRTP does anticipate the need for additional storage facilities. The plan, however, assumes new facilities need to be added in later years and, therefore, provides only a minimal level of funding for facilities in the near- to mid-term years. Recent analysis shows our current storage deficit will increase significantly through 2014 and then more than double the 2014 deficit by the end of the Plan. Given the amount of time needed to identify, acquire and develop suitable new storage and maintenance yards, there is a need to commit the resources now and start the site identification and environmental clearance process so that the needed new facilities are on-line before each new increment of vehicles is put in service.

Financial Analysis

The continued expansion of the light rail system and planned increases in the size of the light rail fleet requires the development of the new facilities in the early years of the LRTP, rather than over the lifespan of the plan. The financial impact of developing these facilities has not been completed. Staff is currently working to identify the full costs associated with the expanded facilities and the level of funding necessary to meet the issues identified in Attachments A, B & C.

NEXT STEPS

Staff is preparing a comprehensive update to the Regional Rail System Plan. The plan would address the needs, identify potential acquisition sites and analyze the alternative financing scenarios for development of the LRT maintenance yard and storage facilities. Staff will return to the Board with an assessment of the potential impacts, including what funds and options are available or needed to meet a reasonable schedule.

ATTACHMENT(S)

A. Light Rail Transit Division Maintenance & Storage Capacity Assessment
B. Key Years Fleet Distribution
C. Illustrated Analysis

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Roger Snoble
Chief Executive Officer

Attachment A

Metro Interoffice Memo

Date	May 20, 2008
To	Roger Snoble CEO
From	Mike Cannell Carol Inge
Subject	Light Rail Transit Division Maintenance & Storage Capacity Assessment

Issues

The introduction of new light rail lines into revenue service, combined with continued annual increases in ridership on existing lines, will require an increase in the number of light rail vehicles and in the yard and maintenance facilities to support them.

Introduction

Today Metro's Light Rail Transit (LRT) system consists of three independent lines each of which is able to provide the following peak headways based upon the current yard storage and maintenance facilities that support each line. Current peak headway services are shown below in comparison to the Long Range Transit Plan (LRTP) peak headway services. This comparison illustrates that Metro will experience limitations to significantly increase service in the future without providing the additional storage and maintenance facilities necessary to support the vehicles that are required to meet the ever growing demand of new riders.

Current Peak Service Levels

LRT Line	Headway (min.)	Cars/Train	Vehicles	Facility Capacity
Blue	5.5/11	3	69	86
Green	7.5	2	28	39
Gold	7.5	2	24	50

LRTP 2030 Service Levels

LRT Line	Headway (min.)	Cars/Train	Vehicles	Facility Capacity
Blue	5	3	92	86
Exposition (Santa Monica 2016)	5	3	77	0
Green	5	3	61	39
Crenshaw 2025	5	3	60	0
Gold (Eastside 2009)	5	3	100	50

It is clear from the above, that each yard and maintenance facility currently in service will not be adequate to meet the projected demand.

Based on current ridership trends on Metro's existing lines and to adequately meet the anticipated ridership demands with the opening of new lines, Metro's planning department employed the services of Parsons Brinkerhoff Inc. (PB) to help forecast maintenance facilities and storage needs at four points in time (snapshots) over the next 22 years:

1. 2009/2010 Opening of Eastside & Exposition Lines
2. 2013 5 Year Plan
3. 2016 Exposition Phase II to Santa Monica
4. 2030 Long Range Plan Design Year (includes the 2025 Crenshaw Line)

For each of these 4 snapshots, PB estimated the total number of light rail vehicles for each line based upon the projected peak headway service. When the number of vehicles assigned to a line to support this service was found to be greater than the capacity of the yard and maintenance facility, the number of "short spaces" have been identified and highlighted in red. One "short space" is simply the amount of space not available to store one rail vehicle.

The total of vehicles currently in service in addition to the project increase of new vehicles is detailed to demonstrate how quickly Metro must respond to the need to store the increase in the light rail fleet in short period of time.

The number of vehicles assigned for each line consists of peak vehicle requirements plus a standard spare ratio of approximately 20%. At the conclusion of this report, a table summary is provided (as Attachment B) to illustrate where all the different vehicle types will be assigned for each of the 4 periods under study.

1. 2009-2010 (Gold Line Eastside and Expo Phase I Start-up)

Total LRT Vehicles Systemwide – **181** (an increase of **60** from 2008)
Total Shortages - 14

GOLD+GOLD EASTSIDE (ATLANTIC)
(50 Car Maintenance Facility Capacity) - **45** cars assigned
7.5 min. Peak revenue service headway / 2 car trains

GREEN
(39 Car Maintenance Facility Capacity) - **36** cars assigned
6 min. Peak revenue service headway / 2 car trains

BLUE
(86 Car Maintenance Facility Capacity) - **77** cars assigned
6 min. Peak revenue service headway / 3 car trains

EXPO I (CULVER CITY)
(0 Car Maintenance Facility Capacity) - **23** cars assigned
12 min. Peak revenue service headway / 3 car trains

** Joined Box Indicate potential joint use of maintenance facilities*

Gold Line and the Eastside Extension

The Gold Line Eastside Extension to East Los Angeles (referred to as the Gold Line) will add 7 two-car trains or 14 vehicles in revenue service as of its scheduled revenue operation date in 2009. Vehicles are currently planned to utilize the Gold Line Yard and Maintenance Facility (Division 21). It is important to note that Division 21 was designed for light duty maintenance and is not equipped to handle vehicle overhauls and, at this time, has no body or paint shop.

Green Line

Based upon current peak loads, a 6-minute headway service is planned as compared to 7.5-minute headway service today. This can be achieved within its current yard and maintenance facility (Division 22).

Blue Line

Today, the Blue Line operates what are essentially two routes; 11-minute headway from 7th St./Metro Center to downtown Long Beach and 11-minute headway from 7th St./Metro Center to Willow Station in North Long Beach. Operating these two routes together yields what is approximately 5.5-minute peak service from 7th St./Metro Center to Willow Station. With the opening of the Exposition Line, the Blue Line peak headway service will be changed to one peak route, operating the entire line (from 7th & Metro to Long Beach) at 6-minute

headway. This is expected to provide improved distribution of passenger loads, reducing some overcrowding in those trains currently operating the entire route. Additionally, operating at the 6-minute headway also becomes necessary to operate jointly with the Expo Line to maintain reasonable expectations for service delivery reliability.

The Blue Line operates from a full services yard and maintenance facility (Division 11), in North Long Beach, 16 miles south of 7th St/Metro Center.

Exposition Line

The Exposition I Line (Expo I) from 7th St./Metro Center to Culver City has a scheduled revenue operation date in year 2010 and will share the Blue Line tracks from Washington Blvd. and Flower St. to 7th St./Metro Center. Expo I is expected to begin with 5 three-car trains or 15 vehicles in revenue service to support a 12-minute peak headway service, operating in between Blue Line trains.

Initially, two separate yard/storage/maintenance sites were identified in the Federal Environmental Impact Statement; one for primary yard and maintenance and the other for mid-day storage only. The primary yard and maintenance site was identified for a location adjacent to Division 11. However, real estate issues have eliminated this site from further consideration. The other site, a narrow strip of land located on Long Beach Ave. East, between Washington Blvd. and 24th St., adjacent to the east side of the Blue Line right-of-way, was deemed appropriate for mid-day storage and purchased last year. To compensate for the loss of the yard and maintenance site adjacent to Division 11, efforts are underway expand the size and scope of the mid-day storage site to allow for overnight storage, cleaning and daily inspections for up to 15 rail vehicles. This expansion requires connecting the new property via a non-revenue connector track across the intersection of Washington Blvd. and Long Beach Ave. to Metro property on the north side that currently has one maintenance-of-way storage track located the site. It must also be noted that constructing this site is dependent upon environmentally clearing this site for cleaning and inspection services, which is anticipated but not certain at this time.

All maintenance of vehicles servicing Expo I will have to be performed at Division 11. This is possible, due to shared trackage with the Blue Line, allowing indirect movement from one line to the other.

2. *2013 (5 Year Plan – Continued Ridership Growth)*

Total LRT Vehicles Systemwide – 221 (an increase of 100 from 2008)

Total Shortages - 49

GOLD+GOLD EASTSIDE (ATLANTIC)
(50 Car Maintenance Facility Capacity) - **65** cars assigned
7.5 min. Peak revenue service headway / 3 car trains

GREEN
(39 Car Maintenance Facility Capacity) - 36 cars assigned
6 min. Peak revenue service headway / 2 car trains

BLUE
(86 Car Maintenance Facility Capacity) - **80** cars assigned
6 min. Peak revenue service headway / 3 car trains

EXPO I (CULVER CITY)
(0 Car Maintenance Facility Capacity) - **40** cars assigned
6 min. Peak revenue service headway / 3 car trains

** Joined Boxes Indicate potential joint use of maintenance facilities*

Gold Line

To meet expected service level demands, a third car will be added to each trainset, which will increase capacity by 50%, resulting in an overall need for 15 additional spaces. To address this, an immediate solution may be extending the tail tracks at the Sierra Madre Villa Station terminus, which would allow storing cars in the middle of the I-210 Foothill Freeway.

Green Line

No increase in service

Blue Line

No increase in service.

Three additional cars are required to return the line to a 20% maintenance spare factor and would be added as soon as vehicles are available, most likely prior to 2016.

Exposition Line

A need for an additional 34 train storage spaces will result once a 6-minute peak headway service with 3-car trains is implemented. The joint operation of the Blue Line and the Expo line requires consistency in train length and headways between the shared portions of the Blue and Expo lines. In short the operations must be complementary to maintain operational balance over the shared portion of the lines. Assuming the Blue Line remains at 6-minute headways, Expo must be, for example, operating at either a 12 or 6-minute headway. Otherwise, unbalanced headways (Blue at 6 minutes and Expo at 8 minutes for example) would result in the trains being scheduled at the same place at the same time every few minutes.

This increase assumes a 100% increase in service and may be more than can be justified based upon ridership demand. However, additionally, because of the significant amount of street-run sections on both lines creating intermittent operational delays and a short turnaround time at the 7th & Metro terminal, all trains must be of the same train length (3-cars). This provides the flexibility required to send out a train on a different route than what it came in from, allowing for scheduled service recovery (from street-run delays as an example) and not reducing capacity requirements on the Blue Line. Operational testing was conducted over the last few months on Flower St. and into 7th St./Metro Center, operating additional trains to simulate a sustained 3-minute trunk headway schedule (every 6-minutes on each line). From this test, it was discovered that small interruptions anywhere along the Blue Line led to delays that allowed Expo trains to arrive at 7th St./Metro Center before the scheduled Blue Line train, and in essence, out of order. To restore service back onto the Blue Line, it became necessary to route the Expo train out of the terminal as a Blue line train. In turn, the late Blue Line train would take the scheduled departure of the Expo train. After testing this operation on two different occasions, it became clear that in order to protect the Blue Line service capacity it experiences today, all trains on both lines must share the same train consist size.

It should be noted, that for Blue and Expo trains to successfully share the same tracks on Flower St. and 7th St./Metro Center terminal *AND* operate at 3-minute trunk headways in an already congested corridor, system and facility improvements will likely be required, possibly including a grade separation at Washington & Flower and greater traffic signal prioritization or pre-emption.

Lastly, it should be noted that the 34 additional spaces identified for 2013 will be only 19 spaces, as it is assumed that the Washington Blvd./Long Beach Ave. yard and inspection site identified for Phase I in 2010 will be environmentally cleared and constructed for 15 vehicles. The additional 19 vehicles will have to be stored in a number of locations away from yard or maintenance facilities, including within the Flower St. tunnel, at 7th St./Metro Center Station, as well as other mainline locations. Although by no means a permanent situation, this operational scenario could be sustainable for a short period of time until the Expo II yard and shop facility is constructed and in service no later than 2016.

3. 2016 (Expo II – Santa Monica)

Total LRT Vehicles Systemwide – 266 (an increase of 145 from 2008)

Total Shortages - 94

GOLD+GOLD EASTSIDE (ATLANTIC)
(50 Car Maintenance Facility Capacity) - **85** cars assigned
***6** min. Peak revenue service headway / 3 car trains*

GREEN
(39 Car Maintenance Facility Capacity) - 36 cars assigned
6 min. Peak revenue service headway / 2 car trains

BLUE
(86 Car Maintenance Facility Capacity) - 80 cars assigned
6 min. Peak revenue service headway / 3 car trains

EXPO I + EXPO II (SANTA MONICA)
(0 Car Maintenance Facility Capacity) - **65** cars assigned
6 min. Peak revenue service headway / 3 car trains

** Joined Boxes Indicate potential joint use of maintenance facilities*

Gold Line

In order to achieve the service identified above, there will be not only a need to store an additional 35 vehicles, but a need to add facilities that will allow the Gold Line to accomplish more than light duty maintenance as it is limited to today. This will require a significant investment in real estate and facilities that will allow this line to support the heavy maintenance that will be required to support rebuilding and performing major overhauls of its assigned vehicles. It must be remembered that the Gold Line is an isolated line and cannot easily transfer cars to other Metro Rail System facilities that can support heavy maintenance functions.

Green Line

No increase in service

Blue Line

No increase in service.

Exposition Line Santa Monica Extension

With the Expo Line extended to Santa Monica, there will be a need to support a 6-minute headway with 3-car trains, resulting in a shortage of up to 59 spaces. Once again, assuming the yard and inspection site identified for Phase I in 2010 will be environmentally cleared and constructed for 15 vehicles, and the Blue Line Division 11 site will support storage of 6 vehicles, the yard and shop storage requirements for Expo will be 39.

4. *2030 (Long Range Transit Plan Assumptions)*

390 Total LRT Vehicles (an increase of 269 from 2008)

Total Shortages – 215

GOLD + GOLD EASTSIDE (ATLANTIC)
(50 Car Maintenance Facility Capacity) - 100 cars assigned
5 min. Peak revenue service headway / 3 car trains

SHORT 50 SPACES

GREEN
(39 Car Maintenance Facility Capacity) - 61 cars assigned
5 min. Peak revenue service headway / 3 car trains

CRENSHAW
(0 Car Maintenance Facility Capacity) - 60 cars assigned
5 min. Peak revenue service headway / 3 car trains

SHORT 82 SPACES

** Joined Box Indicate potential joint use of maintenance facilities*

BLUE
(86 Car Maintenance Facility Capacity) - 92 cars assigned
5 min. Peak revenue service headway / 3 car trains

EXPO I + EXPO II (SANTA MONICA)
(0 Car Maintenance Facility Capacity) - 77 cars assigned
5 min. Peak revenue service headway / 3 car trains

SHORT 83 SPACES

** Joined Box Indicate potential joint use of maintenance facilities*

Draft Long Range Transportation Plan

The Long Range Transportation Plan (LRTP) assumes that all lines will be operating at 5-minute peak headways with the maximum train length of three cars. The 2030 Light Rail system will include 390 vehicles, an increase of 209 vehicles over the 2009-2010 fleet size of 181 vehicles. During this time period, the shortage of maintenance capacity grows from 14 spaces (in 2009) to 215 spaces (in 2030). Over 40% of this shortage will occur prior to 2016. The LRTP assumed the costs to provide future facilities becomes increasingly greater in later years as new lines and extensions are developed. While the Expo 1 and 2 projects anticipate adding additional spaces necessary to open the lines, an adequate location and size of the facility has not been finalized. To this end, the draft 2008 LRTP assumes expenditures of up to $225 million through 2014 for rail yards and rail cars while providing approximately $3.6 billion in the 2016 to 2030 period for system enhancements and replacement related costs. Growth in demand for rail service spurred by increasingly expensive fuel costs, and worsening traffic congestion, indicates the need to accelerate some of these planned expenditures to allow development of the required new and expanded facilities so that they are available as the fleet increases. Adequate and properly located maintenance yard

facilities will not only ensure the reliability of the light rail fleet and its ability to meet the transport needs of the public but provide operating and cost efficiencies as well.

The impact upon each of the lines is as follows:

Gold Line

With the fleet size increasing from 65 vehicles in 2013 (already 15 over the Division 21 capacity) to 100 vehicles no later than 2030, there will be need to construct additional facilities to support a larger and aging fleet.

Green Line

Due to the increase of service, the Green Line Maintenance and Storage becomes an issue for the first time, as there will be a need to increase capacity for 22 additional vehicles. Additionally, in order to allow for operation of 3-car trains, it will be necessary to expand station platforms at four aerial station sites (Aviation, Mariposa, Douglas and Redondo).

Crenshaw Line

The introduction of the Crenshaw line is planned in 2025, with an east-west connection to the Green Line and through-routing options. Assuming the LRTP assumption of 5-minute headways with three car trains, a facility and storage site to accommodate up to 60 vehicles is required. The environmental planning has just begun on this corridor, which must ensure adequate property acquisition to support the facility. It will be possible that the Crenshaw Line can share facilities with the Green Line, similar to the Blue and Expo Lines.

Blue Line

This is the first time the Blue Line sees any real improvement in peak headway within 22 years service with a 1-minute reduction in peak service from 6-minutes to 5 minutes. This increase in fleet size leads to a shortage of 6 spaces, which will likely be addressed by adding one additional track somewhere within the Division 11 yard, or using the revenue or tail tracks within the 7th St./Metro Center Station.

Exposition Line

To support both the Exposition and Blue Line with 5-minute peak headways, there is a need to find one (or more) significant piece(s) of real estate that can support storage and heavy duty maintenance for up to 77 vehicles. Current efforts to environmentally clear suitable land for the Exposition Line remains a challenge, but must be aggressively pursued in order to meet inevitable demands of the future. Assuming the 15 car facility is constructed in 2010 for Expo I there is a need to store and maintain an additional 62 vehicles.

The Gap of 14 Years

It should be noted that no service increases were identified between the years 2016 (the opening of Exposition Phase II to Santa Monica) and 2030 (the 2030 Long Range Transit Plan). It is difficult to forecast service increases over this 14-year span, however, it is only

reasonable to assume services will increase on each of the lines including the Crenshaw Line, which is planned to open in 2025. In response, consideration to begin securing real estate today for the fleet sizes identified for the 2030 plan should be given.

Maintenance Capacity Priority

With all of the pressures to expand Metro's light rail system, it is imperative that the highest priority be given to the support facilities necessary to store and maintain rail vehicles. Unfortunately, due to financial constraints on the three most recent rail projects, beginning with the Gold Line, initial plans for maintenance and storage sites to support them have been reduced substantially.

1. Gold Line (Pasadena) - The initial line included a light duty maintenance facility referred to as Division 21 (also known as Midway) and is tucked up against a fragile hillside. It was envisioned that a larger facility to support heavy maintenance would be added with the construction of the Eastside Extension.

2. Gold Line/Eastside - The Eastside Project was initially designed to include a maintenance facility and yard site at the Heavy Rail Division 20 (the Red Line), which would support both the Gold Line Phase I and the Eastside Extension. However, in order to obtain a federal full funding grant agreement, costs for Eastside project had to be trimmed, resulting in the elimination of this new facility. This decision now requires the existing Midway Facility support both the current and future services of the expanded Gold Line with some site improvements (such as a body shop which is anticipated at this time). Currently, there are no plans today for a new facility.

3. Exposition Line (Phase I) -The Exposition Line Federal Environmental Impact Statement identified two sites to support storage and maintenance facility function, as noted previously in this document. One was identified as a light duty maintenance facility to be constructed immediately adjacent to the Blue Line yard and maintenance facility (Division 11). However, real estate issues have eliminated this site from further consideration. The other location was identified as a mid-day siding designed to allow trains to be stored in the downtown area to avoid costly dead head miles back and forth to Division 11 between the weekday peak periods. To compensate for the loss of the yard and maintenance site adjacent to Division 11, efforts are underway to expand the size and scope of the mid-day storage site to allow for overnight storage, cleaning and daily inspections for up to 15 rail vehicles. This can only be realized if this site can be environmentally cleared.

Necessary Actions

As demonstrated in the above snapshots, there is clearly an urgent need to identify and environmentally clear sites for LRT storage and maintenance facilities to provide adequate support for the service levels identified above. It is therefore recommended that a comprehensive update to the Regional Rail System Plan be developed and continuously updated that includes long-term operations impacts. This plan would address the needs, potential sites and the funding required to develop a centrally-located full service LRT maintenance yard and storage facilities at the terminus of existing and planned extensions.

Further, the system-wide plan would identify any system enhancement of existing signals, traction power, and communications that are needed to ensure proper integration of existing and new rail lines and extensions, remove impediments and barriers to operating efficiencies, and other improvements that allow the system to meet current and future demand. Without such a development and implementation of a comprehensive plan, facilities and other system needs will continue as an afterthought and will lead to cost inefficiencies or lack of service.

Metro planning staff and PB Consultants, in cooperation with the operations and construction staff, is completing a long-term yards and shops needs study. This study will identify potential yards in proximity to existing and planned rail lines in a centralized area of the county. This report will be developed as a board report in the next few months with recommendations and a path forward to insure that Metro meets future facilities needs.

Conclusion

Addressing future LRT ridership demands in Los Angeles County requires a much larger fleet of vehicles and the new and expanded maintenance and storage facilities to support it. The Long Range Transportation Plan projects the need for a fleet of 390 vehicles by 2030. This is an increase of 269 vehicles when compared to the current fleet of 121 in operations today. By the Year 2016, just eight years from now, the projected growth will require 124 additional vehicles than what is operated today.

Metro must now undertake a comprehensive series of activities to plan and develop the maintenance and storage capacity that will be needed to support the Light Rail System. The process that will increase existing capacity must begin before new lines are activated and existing lines are extended. Accelerating the availability of funds for the development of new yards will ensure that the needed facilities can be developed in time to ensure the reliability of the fleet and its ability to meet public demand

While the provision of some of the required new capacity has been funded in the individual rail lines, development of these facilities has been hampered by difficulties in identifying suitable sites that will meet current and projected needs. Additionally, changes in the Federal Transit Administration (FTA) funding criteria reduced potential federal funding for maintenance facility development to support only the vehicles required for project ridership projections based on the first ten years of revenue service. While the LRTP and early rail planning efforts recognized the need for larger facilities, this FTA funding criteria change has influenced Metro's decisions to defer development of these facilities until the later years of the Long Range Transit Plan.

The draft 2008 LRTP anticipates the need for storage facilities and provides limited funding for this purpose. The LRTP, however, assumes the need to add new facilities in its later years and provides only a minimal level of funding for new facilities in those later years. Recent analysis shows the current Agency storage deficit will increase significantly through 2014 and then more than double the 2014 deficit by the end of the Plan. Given the amount of time needed to identify, acquire and develop suitable new storage and maintenance yards, there is a need to commit the resources now in order to have the needed new facilities on-line before each new increment of vehicles is put in service.

Accelerating the availability of funds for this purpose will ensure the necessary facilities are operational by 2016, when the number of vehicles will significantly exceed existing capacity. In turn, this will allow for the Light Rail System to maintain service reliability and provide adequate capacity to meet projected ridership demands.

To ensure Metro can meet the ridership forecasts, Metro must take swift and meaningful actions to secure maintenance and storage facility sites to support a fleet that will grow by approximately 200% over the next 22 years.

A summary of the above analysis is visually illustrated in Attachment C provided by Parsons Brinkerhoff Inc.

Key Years Fleet Distribution

Attachment B

1. FY 2009/2010 Gold Line Eastside Extension / Expo I Openings

VEHICLE TYPE	Blue	Expo	Green	Crenshaw	Gold	Total	Accum	
SUMITOMO P865 $	*31*	*23*				54	54	
SUMITOMO P2020 $	*15*					15	69	
SIEMENS P2000	16		36			52	121	
2550 Base (50 In delivery)	5				45	50	171	
Sub Total - In service/In delivery	67	23	36	0	45	171		
Additional Vehicles Required								
2550 Option 1 (50, not executed)	10					10	181	
2550 Option 2 (50, not executed)						0	181	
Sub Total - Additional Vehicles Required	10	0	0	0	0	10		
Peak Service Consist	3	3	2	n/a	2			
Peak Service Line Headway	6	12	6	n/a	7.5			
Peak Service Trunk Headway	3-3-6		n/a		n/a			
								Exceeds Today's Fleet
Total Vehicles Required	77	23	36	0	45	181		60
Facilties Storage Capacity*	86	0	39	0	50			Exceeds Today's Capacity
Additonal Storage Needed	-14		0	0	0			14

2. FY 2013 5 - Year Plan

VEHICLE TYPE	Blue	Expo	Green	Crenshaw	Gold	Total	Accum	
SUMITOMO P865 $	*31*	*23*				54	54	
SUMITOMO P2020 $	*15*					15	69	
SIEMENS P2000 $	*16*		*36*			52	121	
2550 Base (50 In delivery)	5				45	50	171	
Sub Total - In service/In delivery	67	23	36	0	45	171		
Additional Vehicles Required								
2550 Option 1 (50, not executed)	13	17			20	50	221	
2550 Option 2 (50, not executed)						0	221	
Sub Total - Additional Vehicles Required	13	17	0	0	20	50		
Peak Service Consist	3	3	2	n/a	3			
Peak Service Line Headway	6	6	6	n/a	7.5			
Peak Service Trunk Headway	3		n/a		n/a			
								Exceeds Today's Fleet
Total Vehicles Required	80	40	36	0	65	221		100
Facilties Storage Capacity*	86	0	39	0	50			Exceeds Today's Capacity
Additonal Storage Needed	-34		0	0	-15			49

Blue Line and Exposition Line have trunked operations north of Washington/Flower

Green Line and Crenshaw Line proposed to have trunked operations west of Aviation, south of Century

$ - Vehicles require significant expenditures for overhauls per manufacturer specification to ensure 40 year lifespan.

* - Assumes Blue Line and Expo Line share facilities storage capacity.

3. FY 2016 Expo Phase II to Santa Monica Opening

VEHICLE TYPE	Blue	Expo	Green	Crenshaw	Gold	Total	Accum
SUMITOMO P865 $	31	23				54	54
SUMITOMO P2020 $	15					15	69
SIEMENS P2000 $	16		36			52	121
2550 Base (50 In delivery)	5				45	50	171
Sub Total - In service/In delivery	67	23	36	0	45	171	
Additional Vehicles Required							
2550 Option 1 (50, not executed)	13	17			20	50	221
2550 Option 2 (50, not executed)		25			20	45	266
Sub Total - Additional Vehicles Required	13	42	0	0	40	95	
Peak Service Consist	3	3	2	n/a	3		
Peak Service Line Headway	6	6	6	n/a	6		
Peak Service Trunk Headway	3		n/a		n/a		
							Exceeds Today's Fleet
Total Vehicles Required	80	65	36	0	85	266	145
Facilties Storage Capacity*	86	0	39	0	50		Exceeds Today's Capacity
Additonal Storage Needed	-59		0	0	-35		94

4. FY 2030 Long Range Plan / 2025 Crenshaw Opening

VEHICLE TYPE	Blue	Expo	Green	Crenshaw	Gold	Total	Accum
SUMITOMO P865 @	31	23				54	54
SUMITOMO P2020 @	15					15	69
SIEMENS P2000 @			52			52	121
2550 Base (50 In delivery)	5				45	50	171
Sub Total - In service/In delivery	51	23	52	0	45	171	
Additional Vehicles Required							
2550 Option 1 (50, not executed)	13	17			20	50	221
2550 Option 2 (50, not executed)	5	25			20	50	271
TBD LRT Vehicles	23	12	9	60	15	119	390
Sub Total - Additional Vehicles Required	41	54	9	60	55	219	
Peak Service Consist	3	3	3	3	3		
Peak Service Line Headway	5	5	5	5	5		
Peak Service Trunk Headway	2.5		2.5#		n/a		
							Exceeds Today's Fleet
Total Vehicles Required	92	77	61	60	100	390	269
Facilties Storage Capacity*	86	0	39	0	50		Exceeds Today's Capacity
Additonal Storage Needed	-83		-22	-60	-50		215

Blue Line and Exposition Line have trunked operations north of Washington/Flower

Green Line and Crenshaw Line proposed to have trunked operations west of Aviation, south of Century

$ - Vehicles require significant expenditures for overhauls per manufacturer specification to ensure 40 year lifespan.

@ - Significant expenditures required to replace vehicles, as they are at the end of their 40-year lifespan.

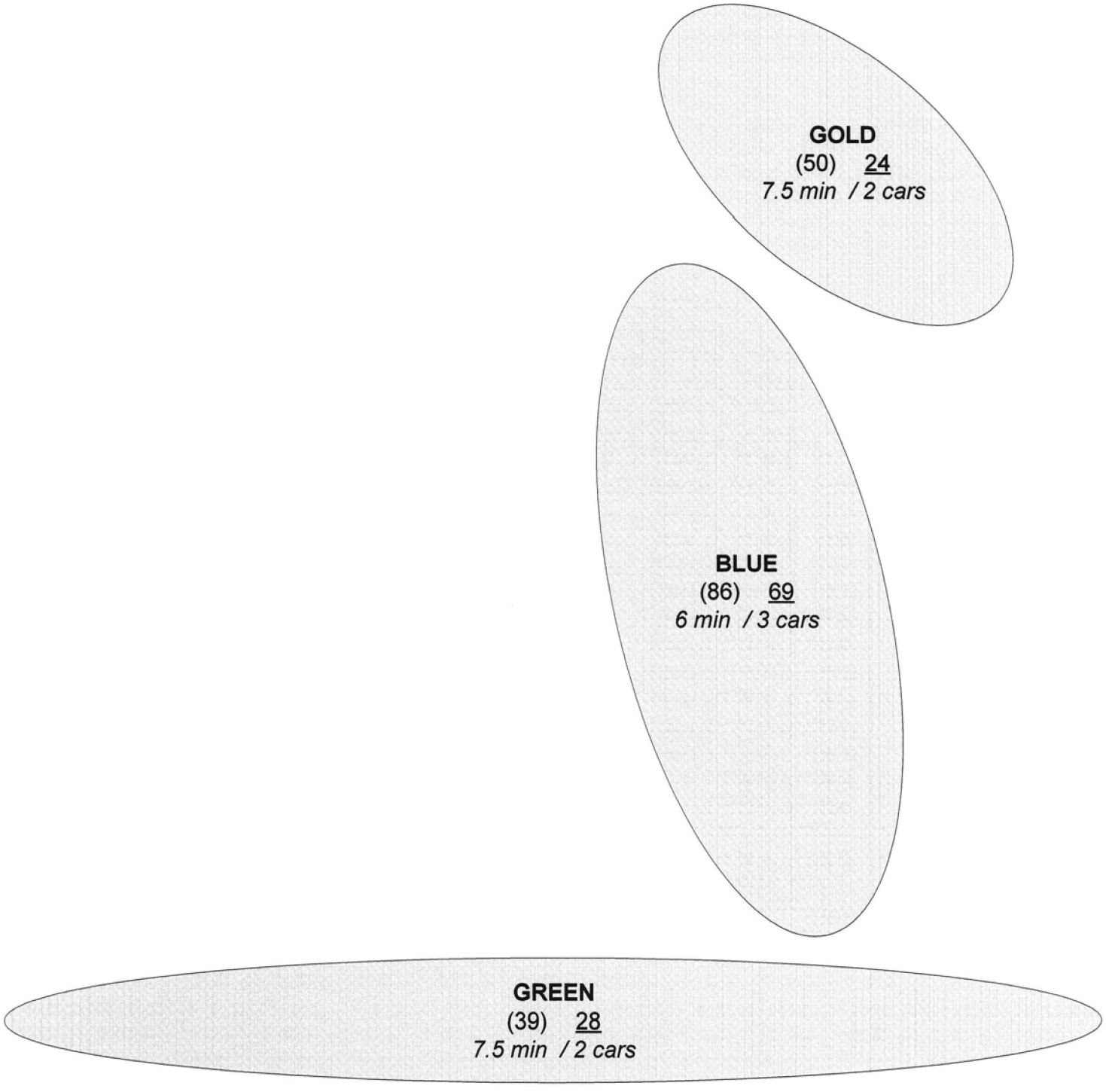
* - Assumes Blue Line and Expo Line share facilities storage capacity.

#- Assumes Crenshaw line is constructed with interlining options to the Green Line.

Existing

Existing System
121 Total

KEY:
(Maintenance Facility Capacity) Vehicle Supply *headway / consists*



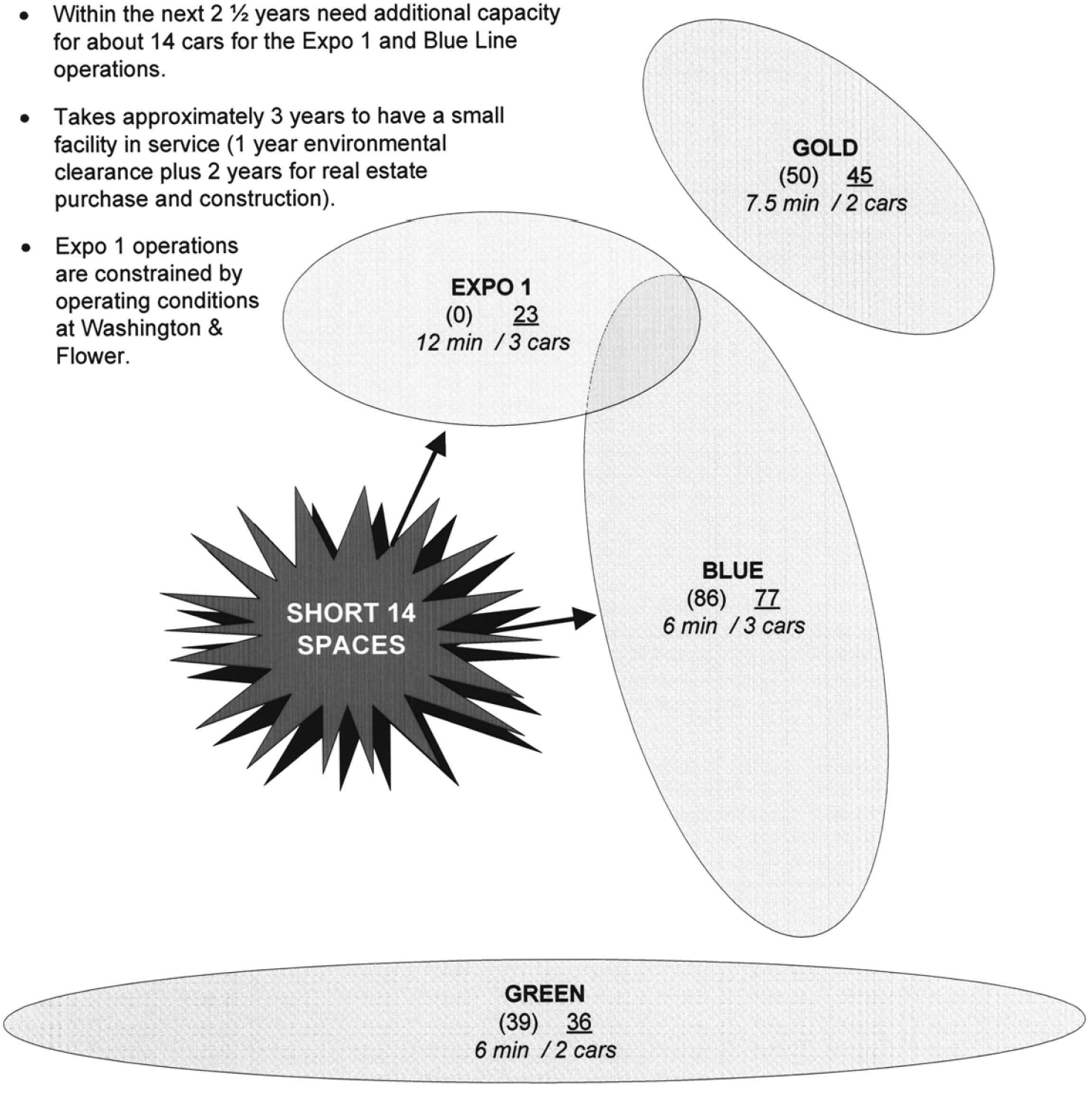
2009 – 2010 (2 1/2 Year Plan)

Opening Day Operations for Expo 1 & Eastside
181 Total

KEY:
(Maintenance Facility Capacity) Vehicle Supply *headway / consists*

NOTES:

- Within the next 2 ½ years need additional capacity for about 14 cars for the Expo 1 and Blue Line operations.
- Takes approximately 3 years to have a small facility in service (1 year environmental clearance plus 2 years for real estate purchase and construction).
- Expo 1 operations are constrained by operating conditions at Washington & Flower.



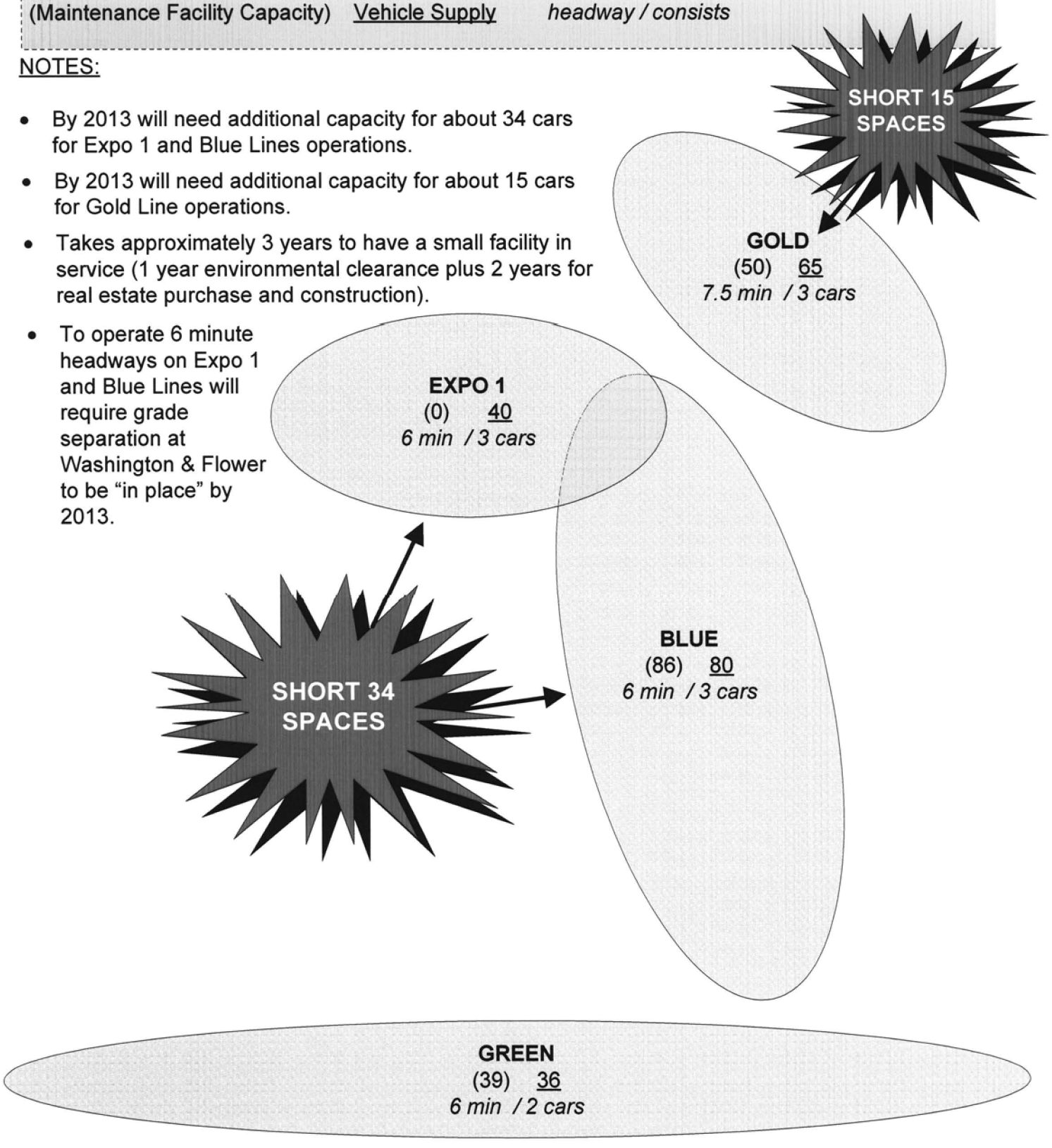
2013 Plan (5 Year Plan)

221 Total

KEY:
(Maintenance Facility Capacity) Vehicle Supply *headway / consists*

NOTES:

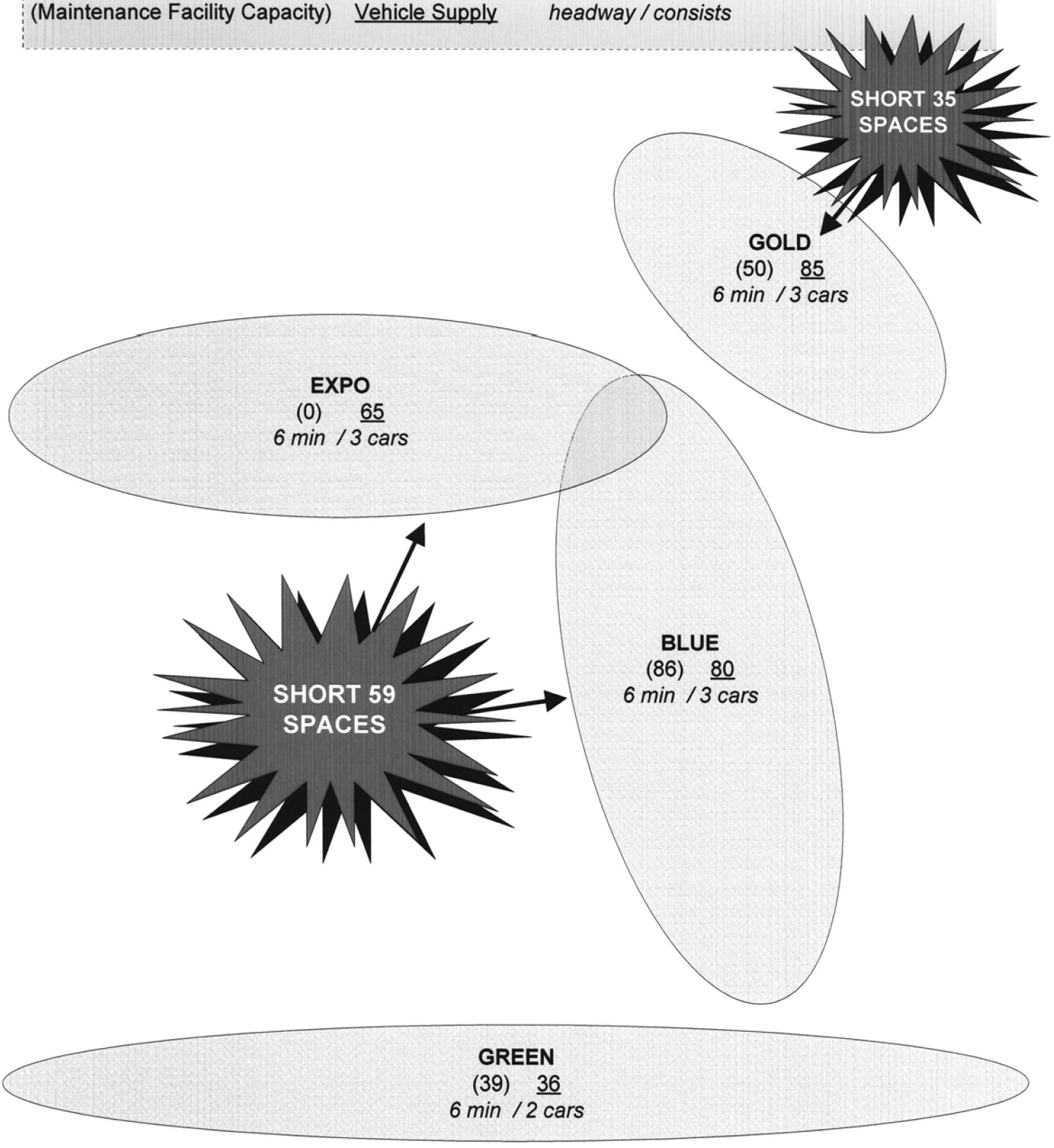
- By 2013 will need additional capacity for about 34 cars for Expo 1 and Blue Lines operations.
- By 2013 will need additional capacity for about 15 cars for Gold Line operations.
- Takes approximately 3 years to have a small facility in service (1 year environmental clearance plus 2 years for real estate purchase and construction).
- To operate 6 minute headways on Expo 1 and Blue Lines will require grade separation at Washington & Flower to be "in place" by 2013.



2016 (Expo 2 in Revenue Operations)

266 Total

KEY:
(Maintenance Facility Capacity) Vehicle Supply *headway / consists*



2030 LRTP Baseline Assumptions

360 to 390 Total

KEY:
(Maintenance Facility Capacity) Vehicle Supply *headway / consists*

NOTES:

- Without consideration of Regional Connector, the 7th/Metro Station will not be able to accommodate the operation of the Expo and Blue Lines at 5-minute headways and will not have the ability to accept ANY Crenshaw trains.
- 4 Green Line stations must be lengthened to accommodate 3-car trains.