

Utah OPS: Building on SUCCESS

September 8, 2016
Salt Palace Convention Center

HOW TO AVOID “WIP-LASH”
Understanding and Managing Work-in-Process (WIP)
to Increase Speed and Throughput

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Daniel O’Bannon, Commerce



S U C C E S S
— F R A M E W O R K —

Why SUCCESS?

Why does the state invest your time to apply the principles of the SUCCESS Framework to your systems?

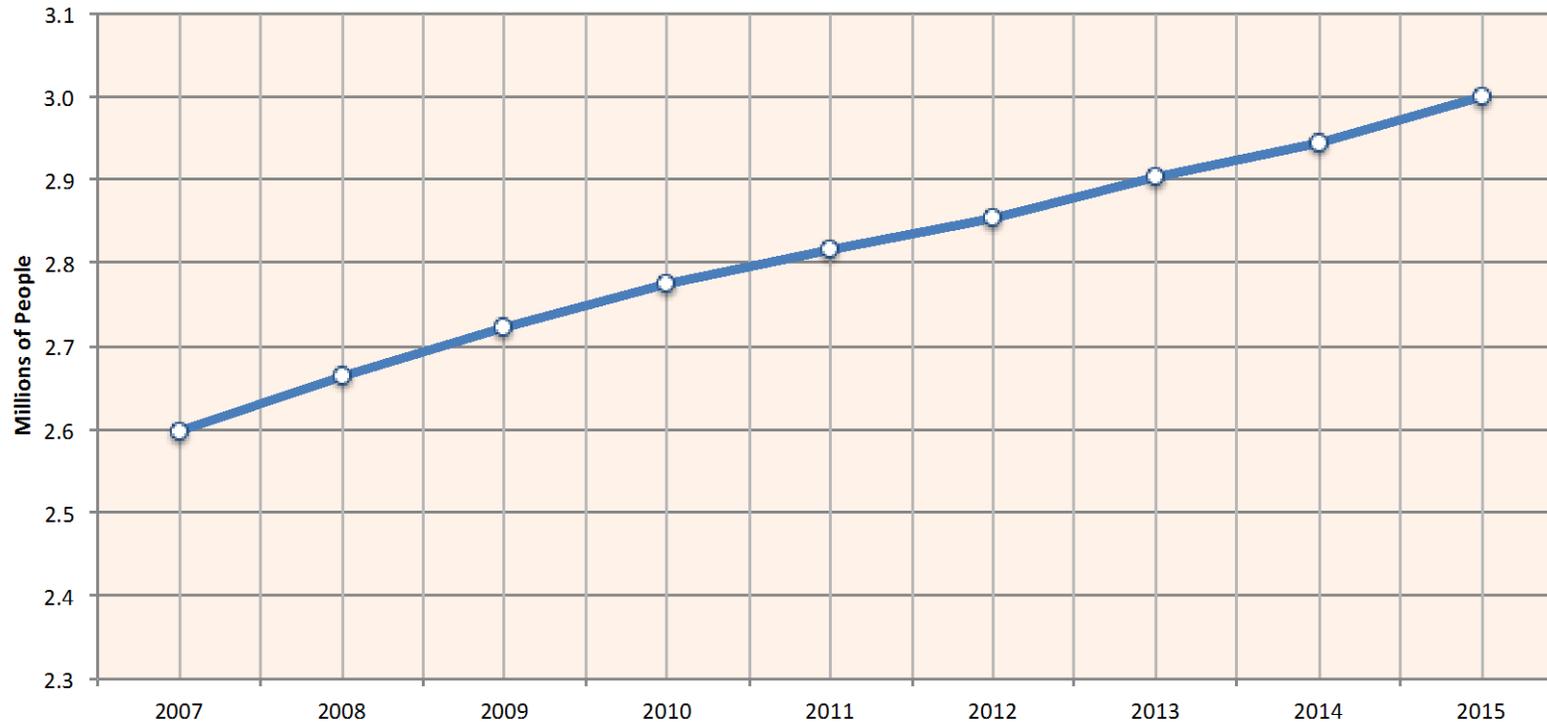


Why SUCCESS?

- Continuous Improvement
- Customer Satisfaction
- Executive Focus



Trend in the Population for the State of Utah



Between 2007 and 2015, the state population increased 16 percent – almost twice the national average.

Population growth is the single most influential driver of increased demand for public services.

Change in Tax Revenue From Each State's Peak Quarter, Adjusted for Inflation

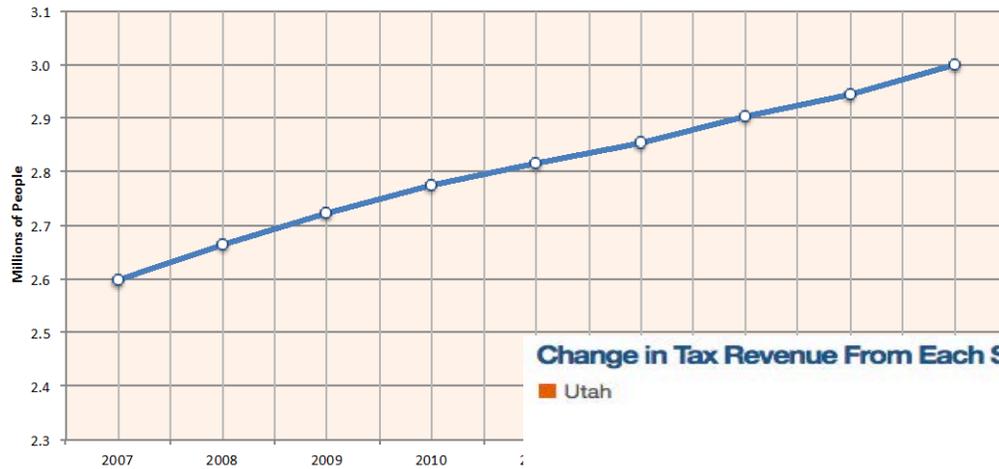
■ Utah



Inflation-adjusted state tax revenues continue to rise with a robust economy; however, they still lag behind Utah's peak proceeds realized in 2007.

This means that today, there are fewer inflation-adjusted revenues per Utahn than in 2007.

Trend in the Population for the State of Utah



Change in Tax Revenue From Each State's Peak Quarter, Adjusted for Inflation

Utah



The SUCCESS Framework assists state agencies to meet increased demand with available revenues.



Strategies

QT/OE

The metrics of SUCCESS monitor the relationships between quality throughput (units that meet established standards of performance) and costs.

So, if we can improve the quality and/or increase the throughput per dollar, we achieve the goals of the SUCCESS Framework.



WIP

Strategies

One of the strategies of the SUCCESS Framework is the management of Work in Process.

This presentation addresses the change in throughput that results from better management of WIP.



Work in Process (WIP)

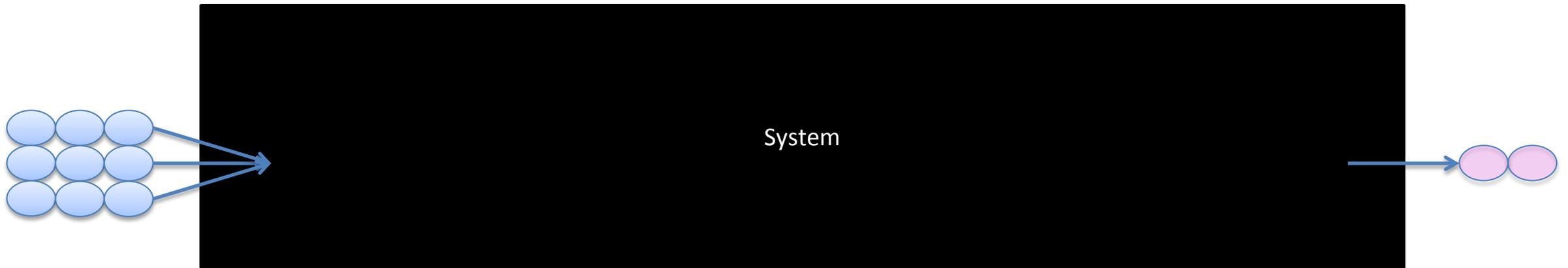
- WIP is the count of throughput units that have entered the system
- The amount of WIP in the system drives the activities performed by system resources (people and equipment)
- WIP is a function of 1) the throughput rate and 2) the total time units are in the system including wait time (this is the total lead time)

Scenario

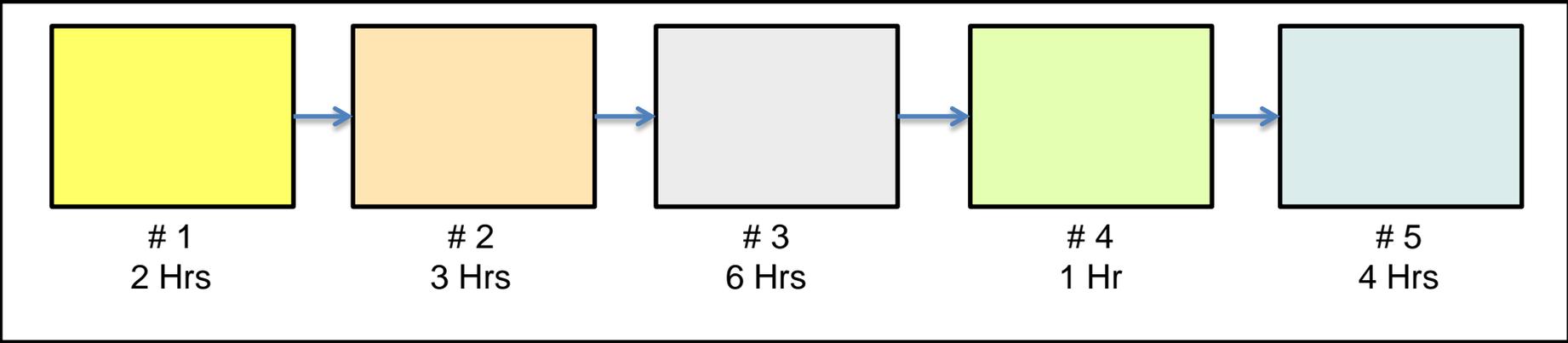
Work in Process (WIP)

- For one system, management has observed a recent increase in demand (arrival rate); the arrival rate is 1 unit every 2 hours
- Customers complain that it's taking longer and longer for throughput to finish up
- The supervisor reports that it should take 16 hours to process units of throughput (touch time)
- She has observed a couple of bottlenecks in the system
- Due to increased volume, it takes about 2 weeks to complete throughput (total lead time)

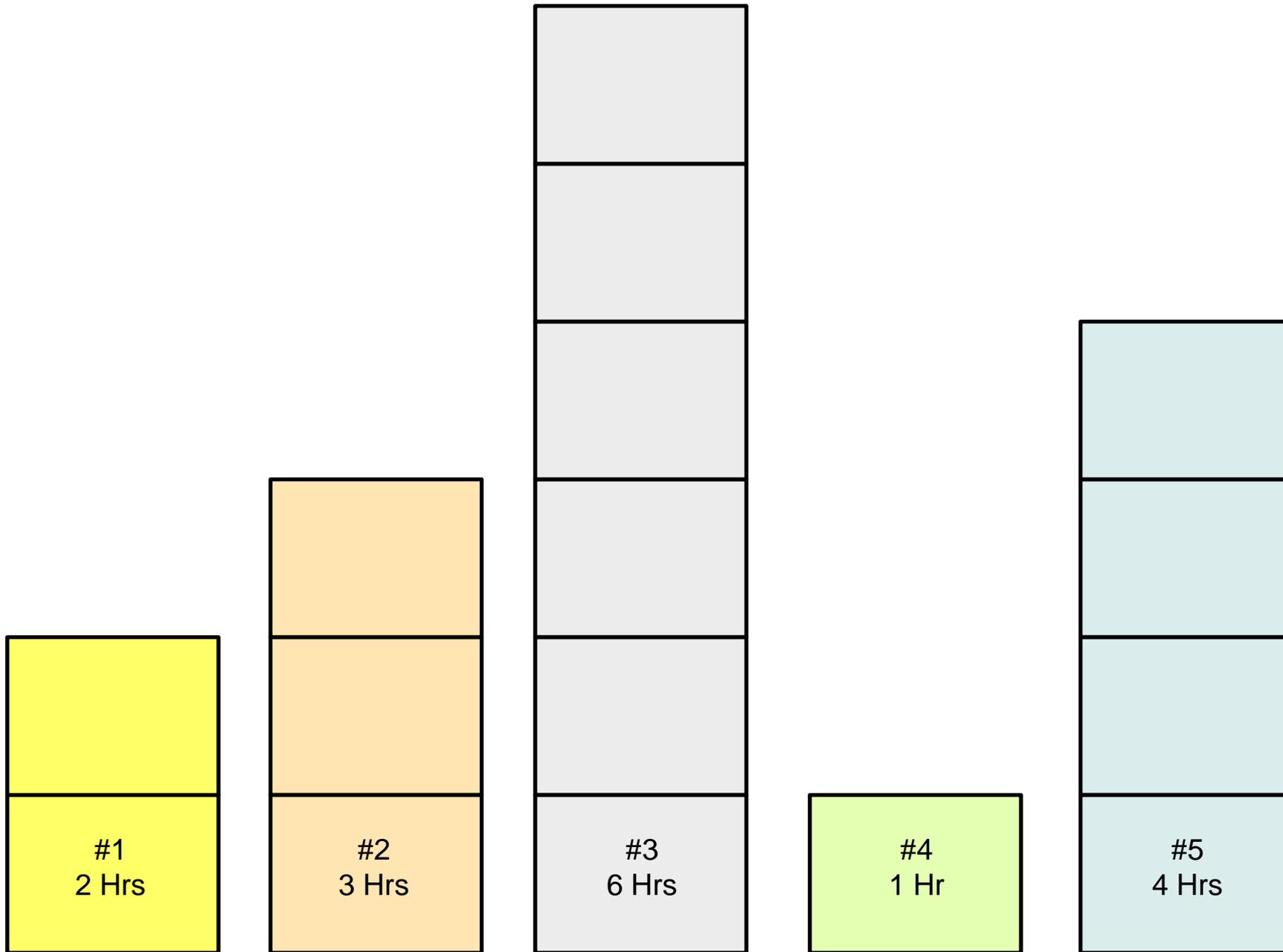
Units of throughput enter the system at a greater rate than they come out – and they take longer and longer to process

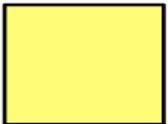
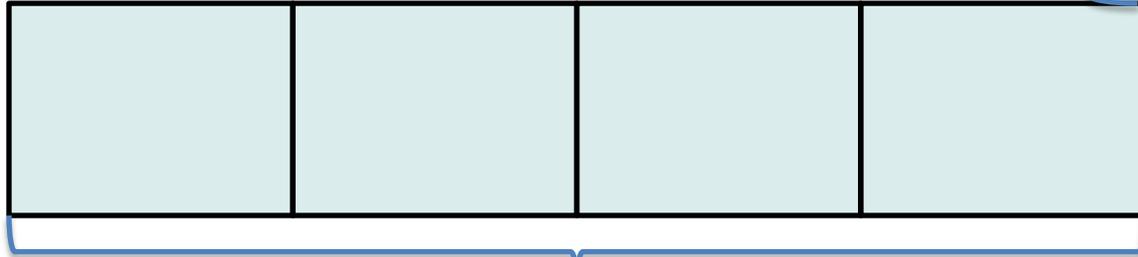
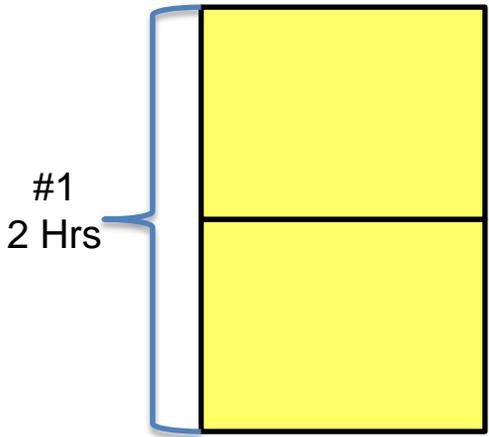
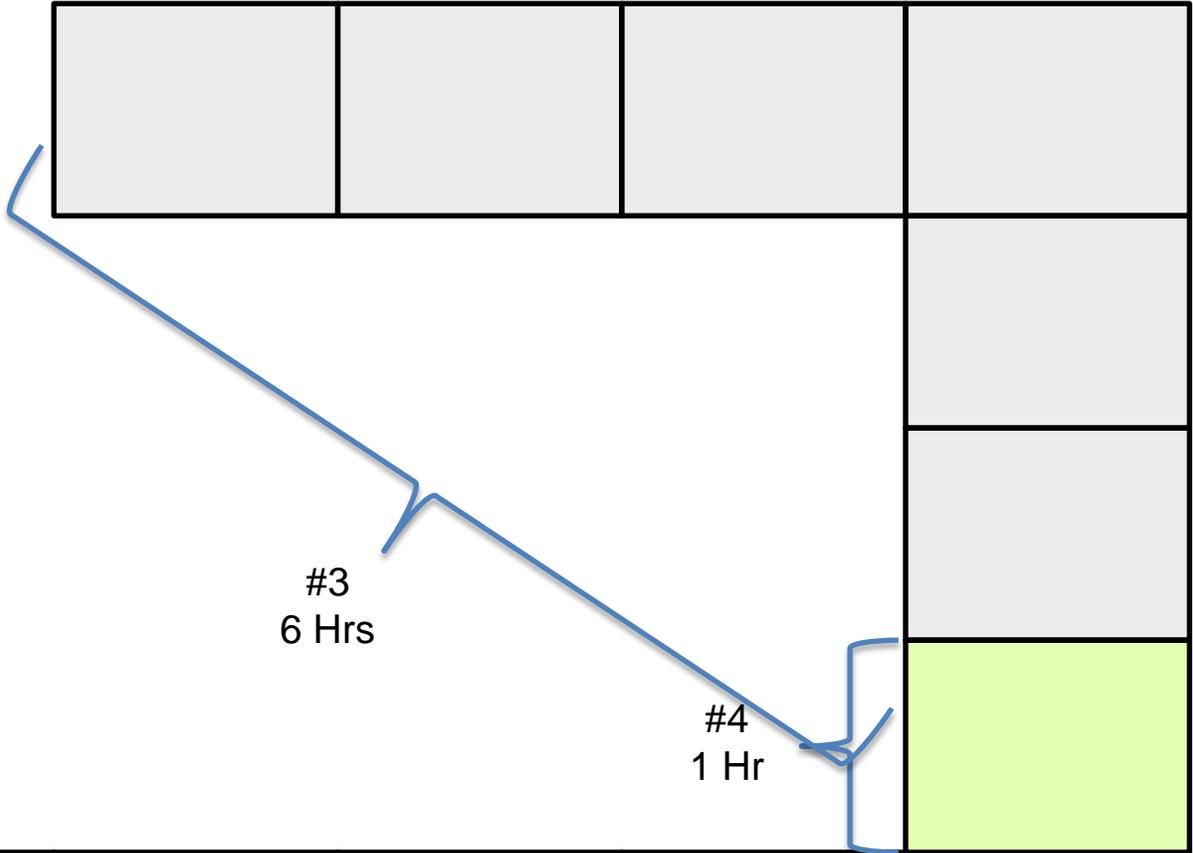
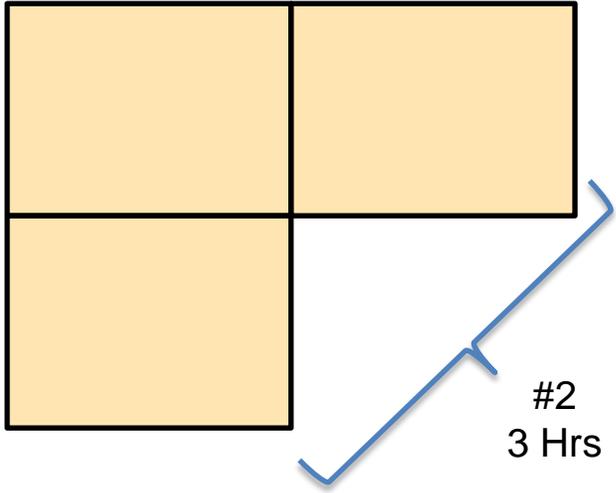


What's going on?









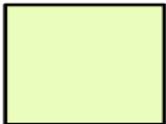
1
2 Hrs



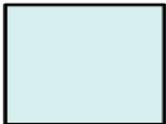
2
3 Hrs



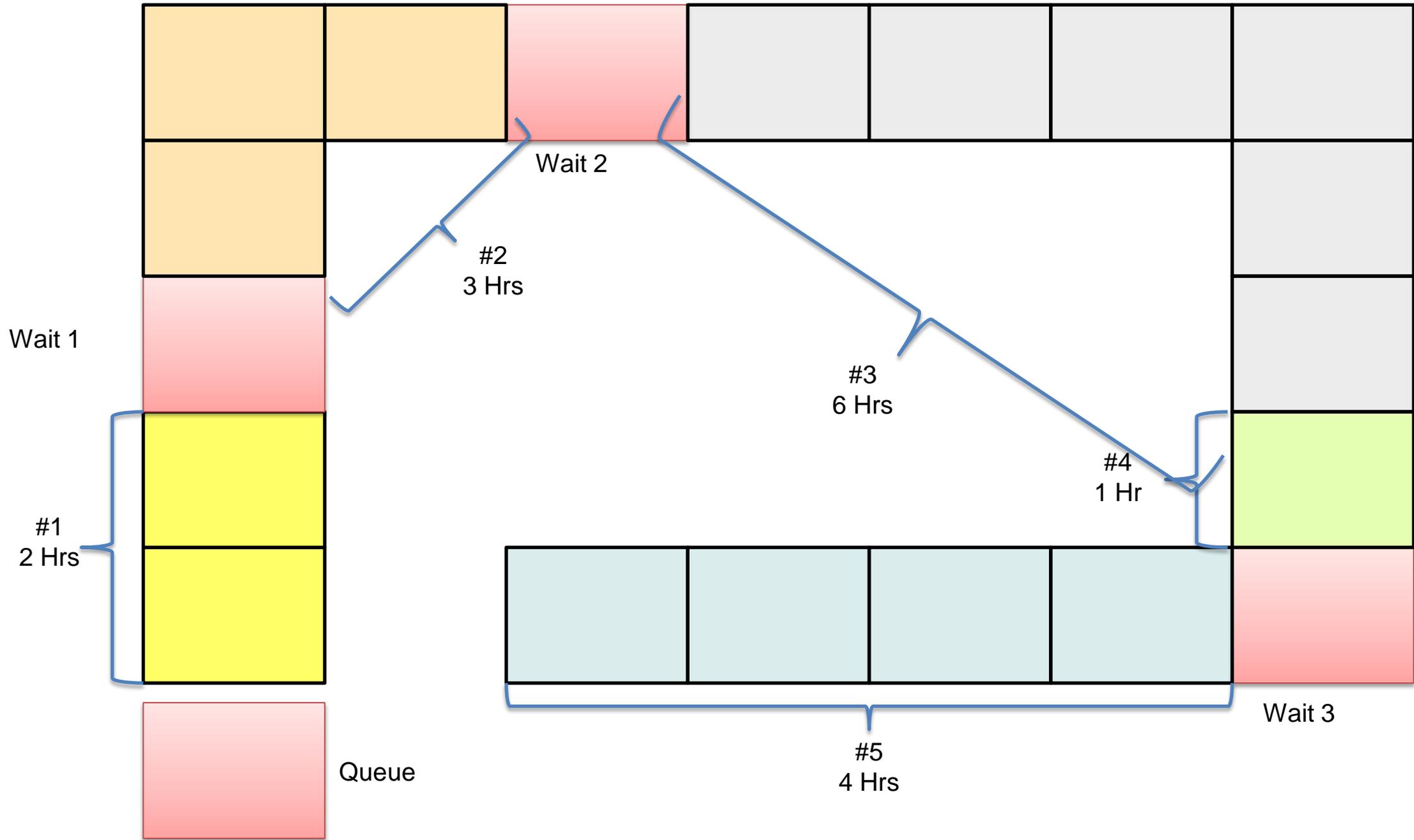
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6 Hrs

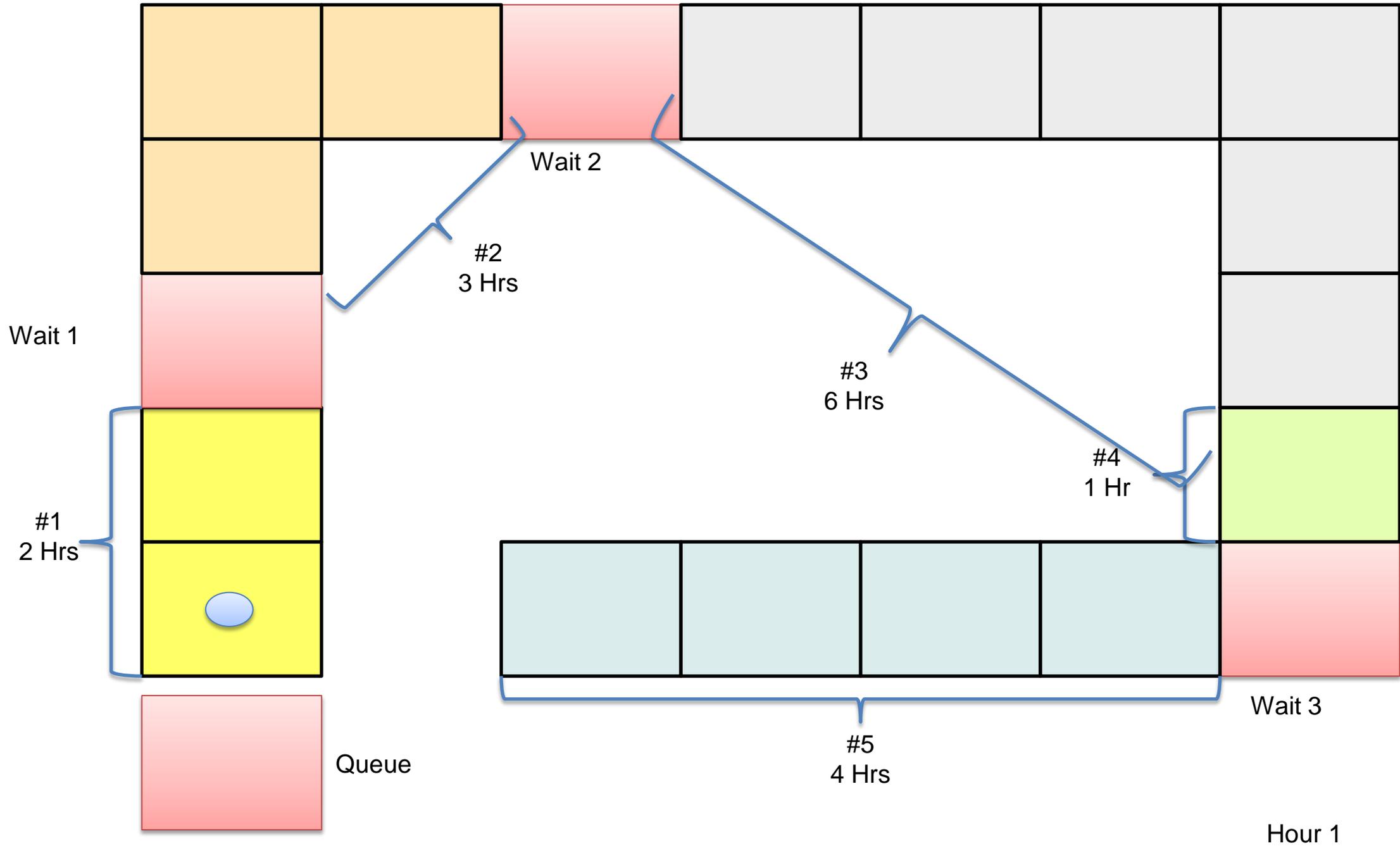


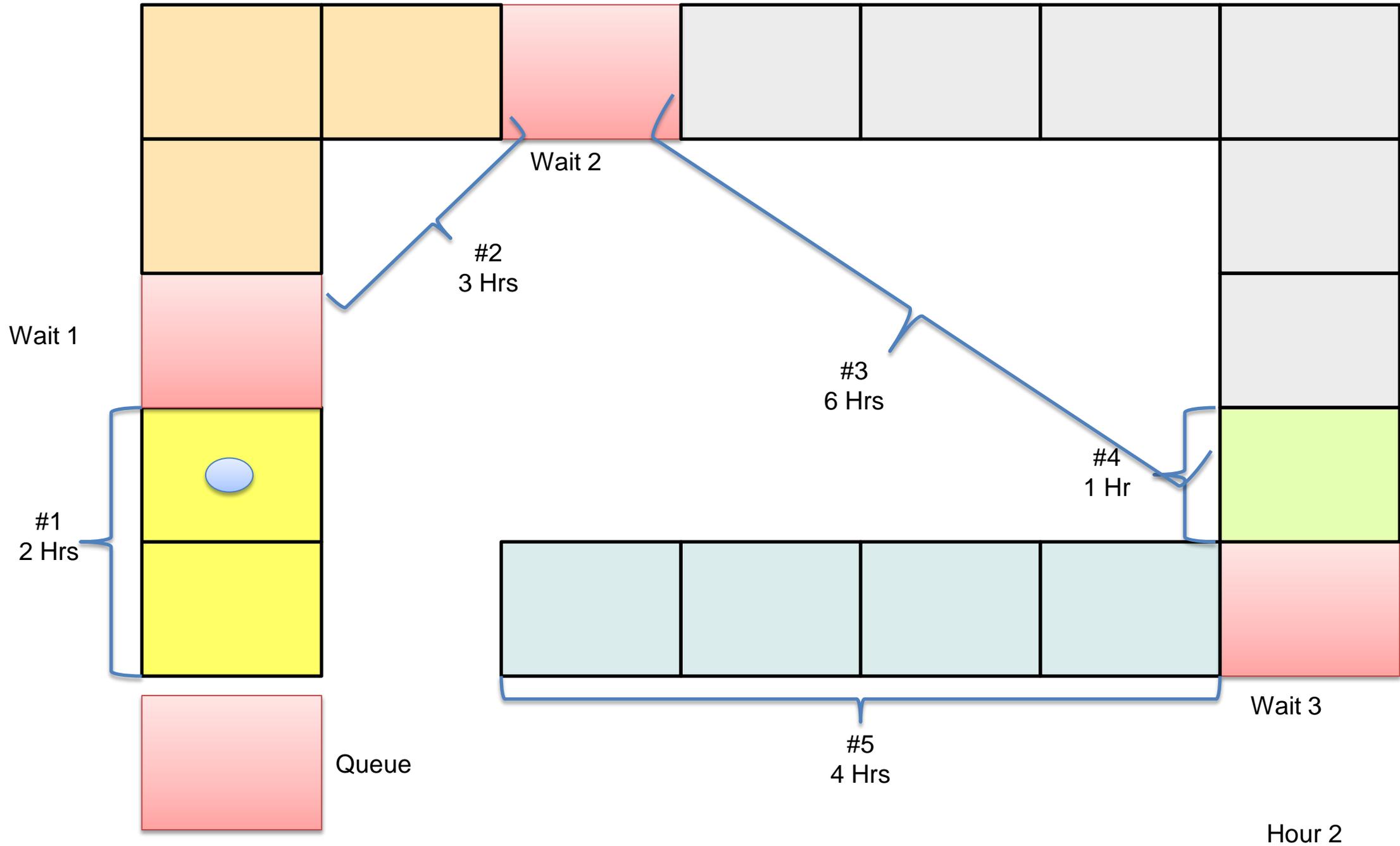
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1 Hr

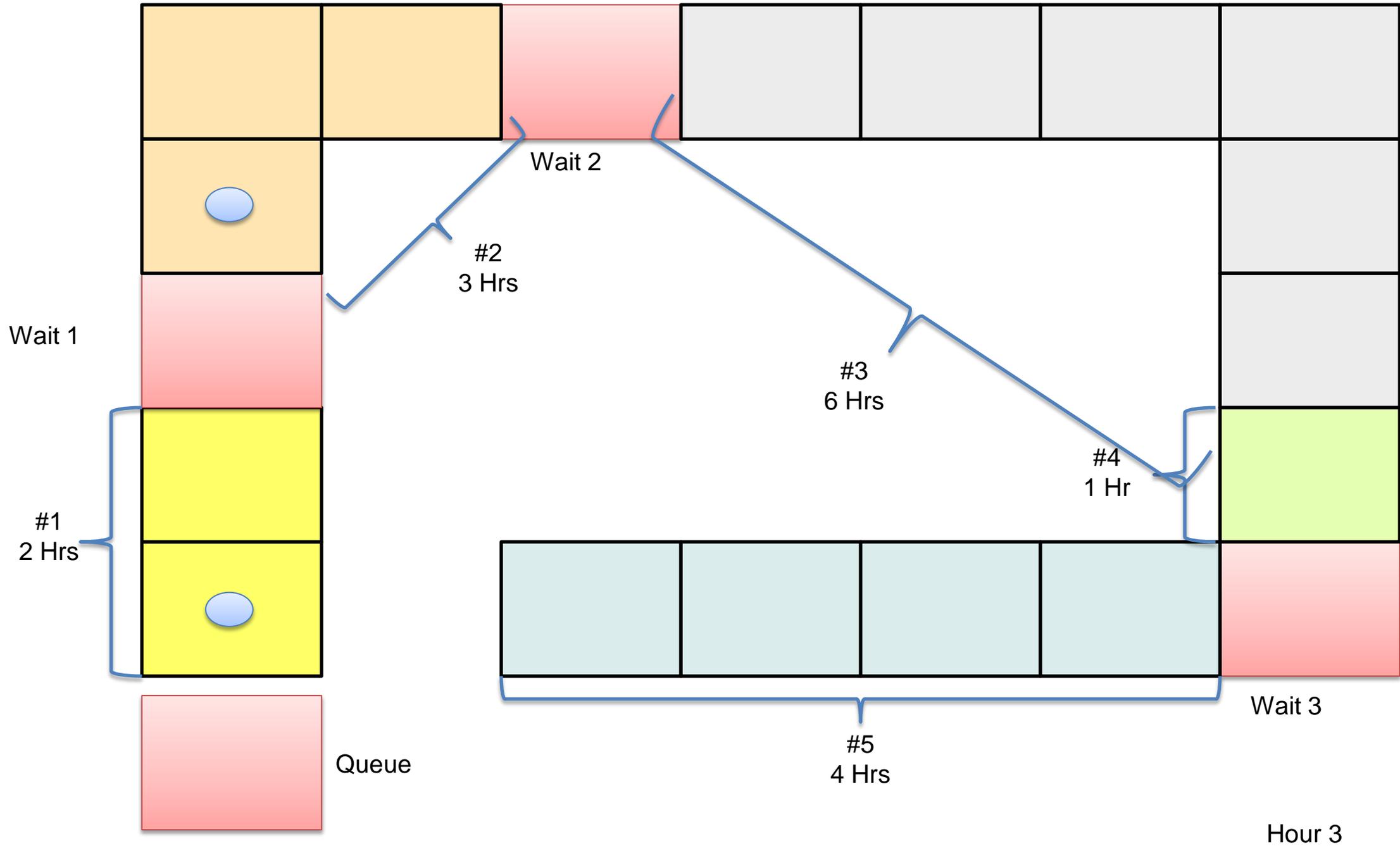


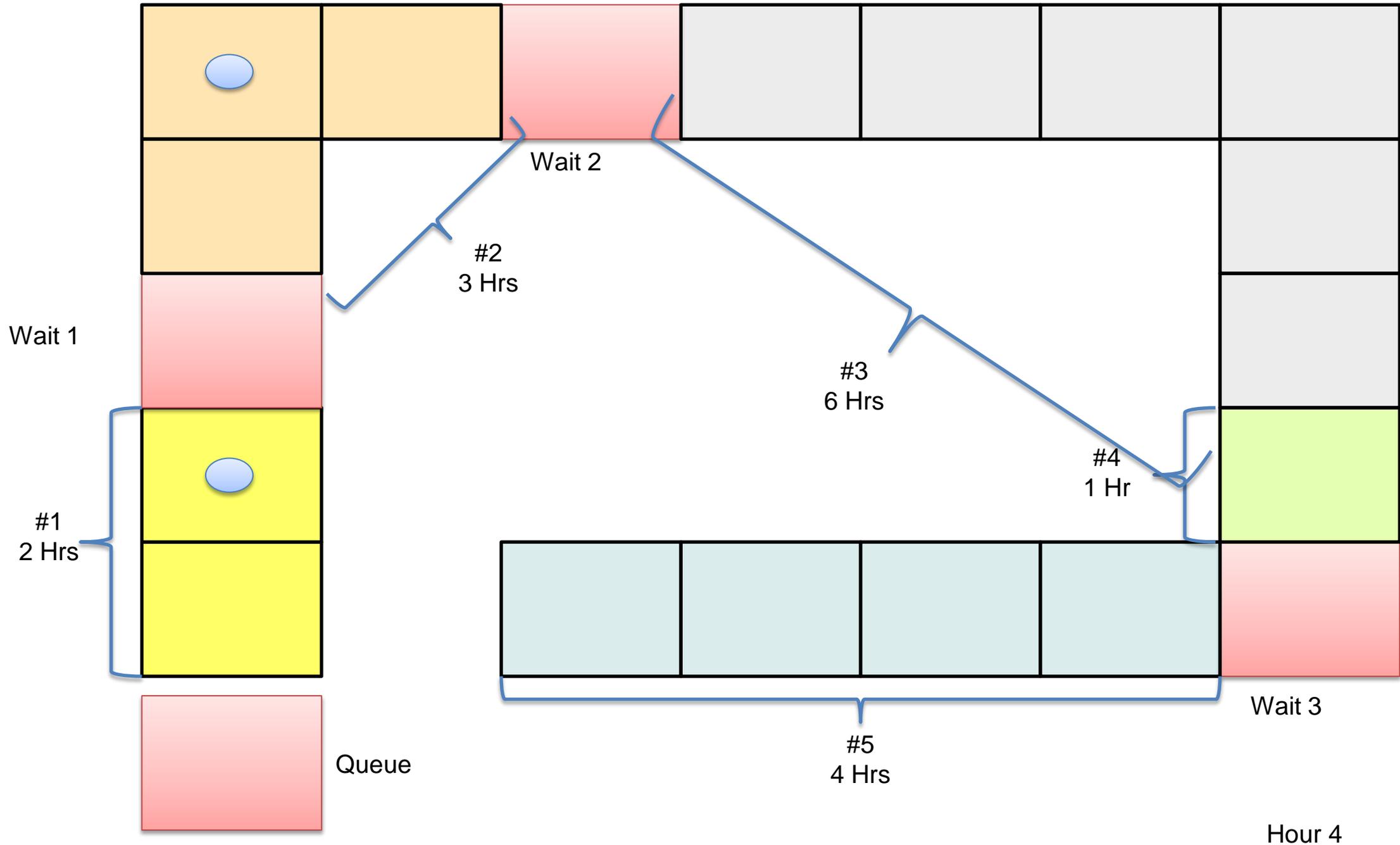
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4 Hrs

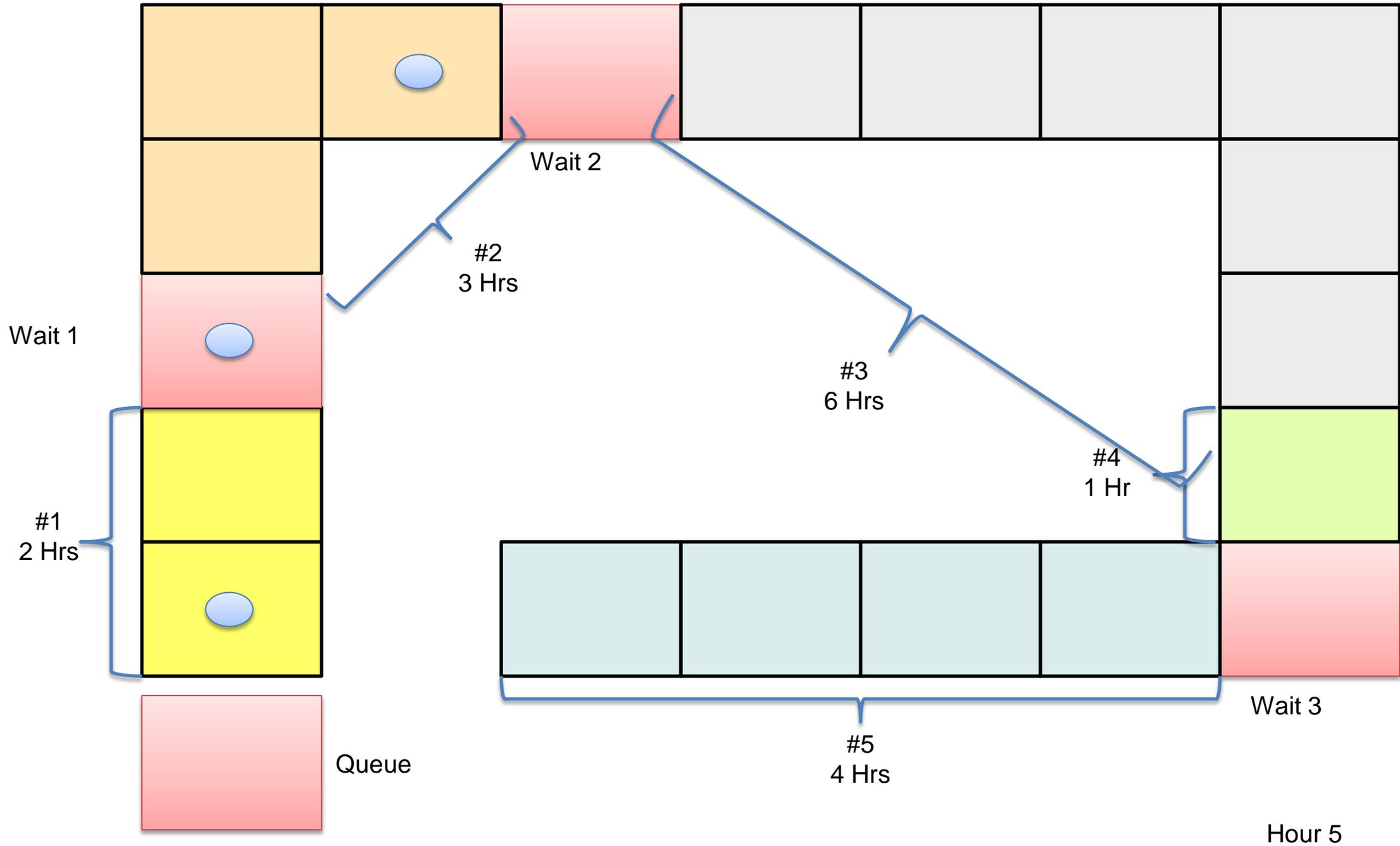


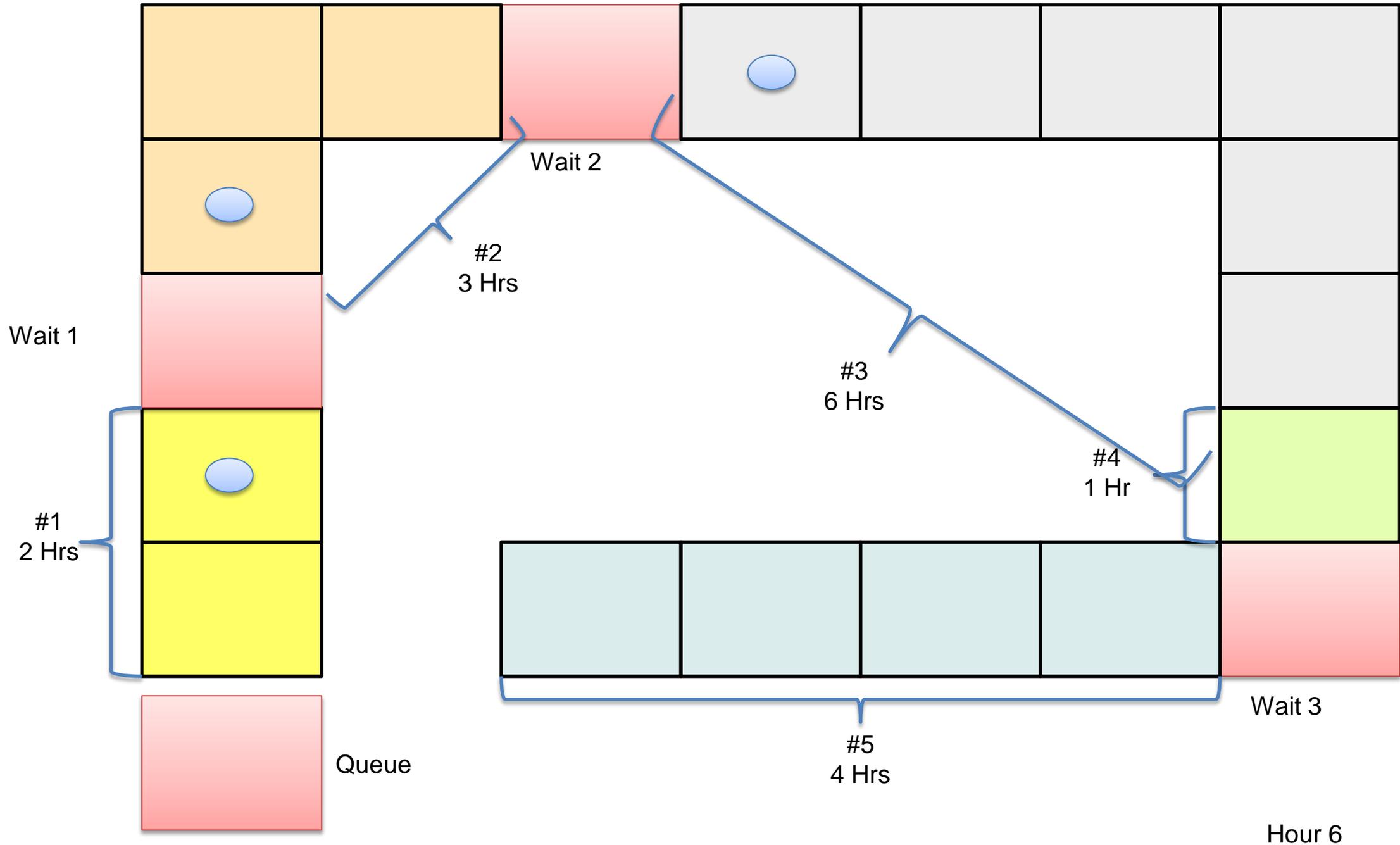


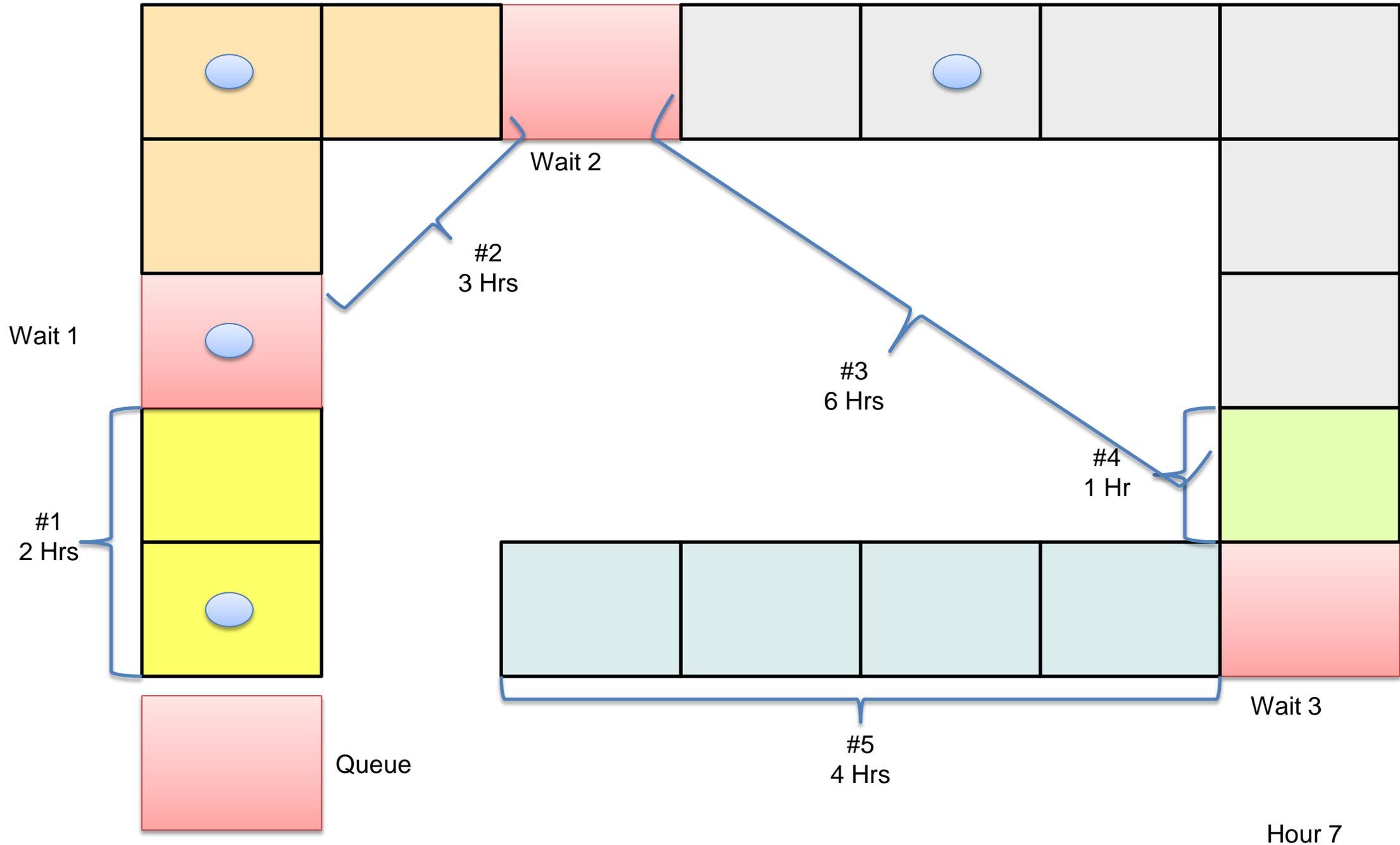


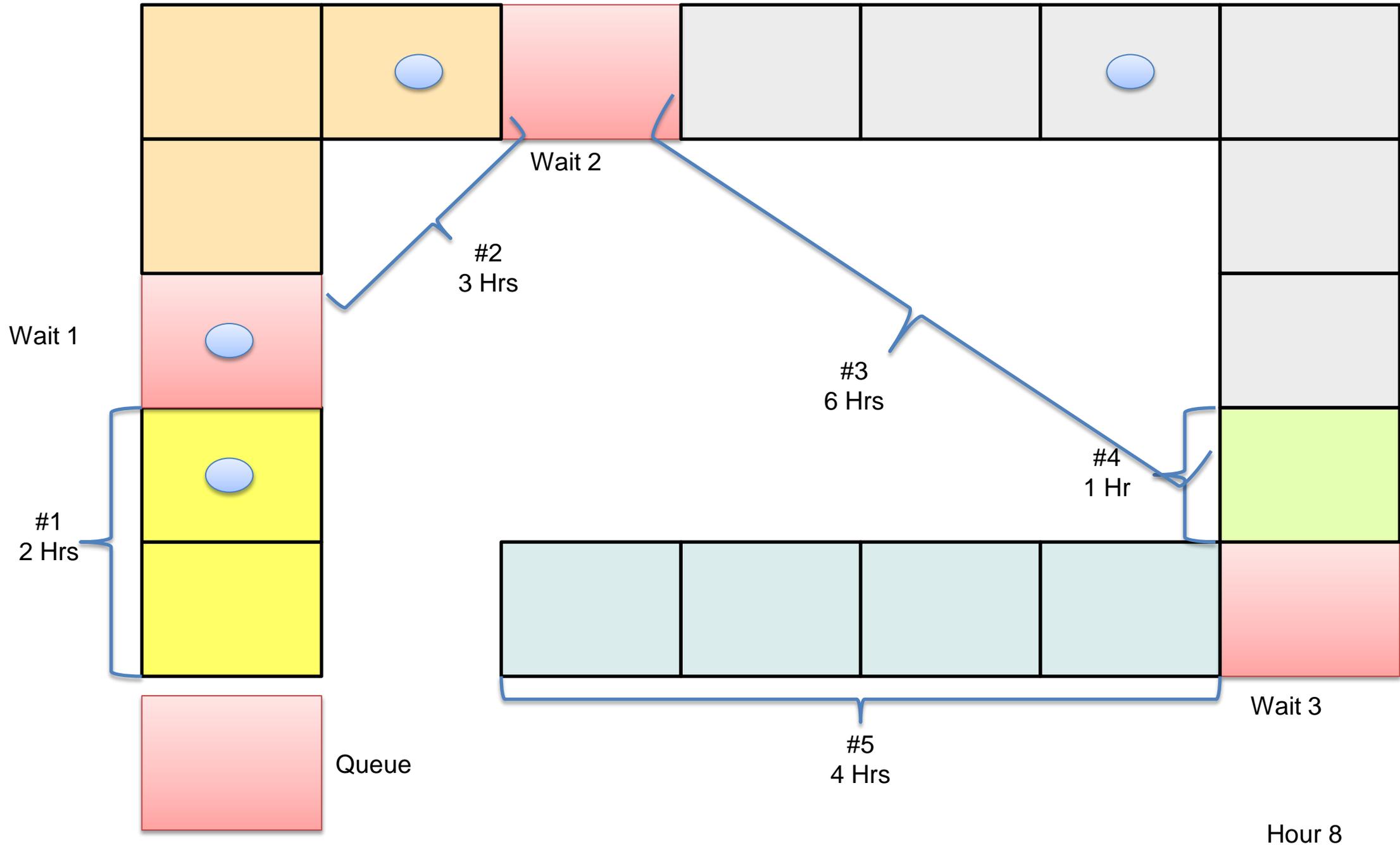


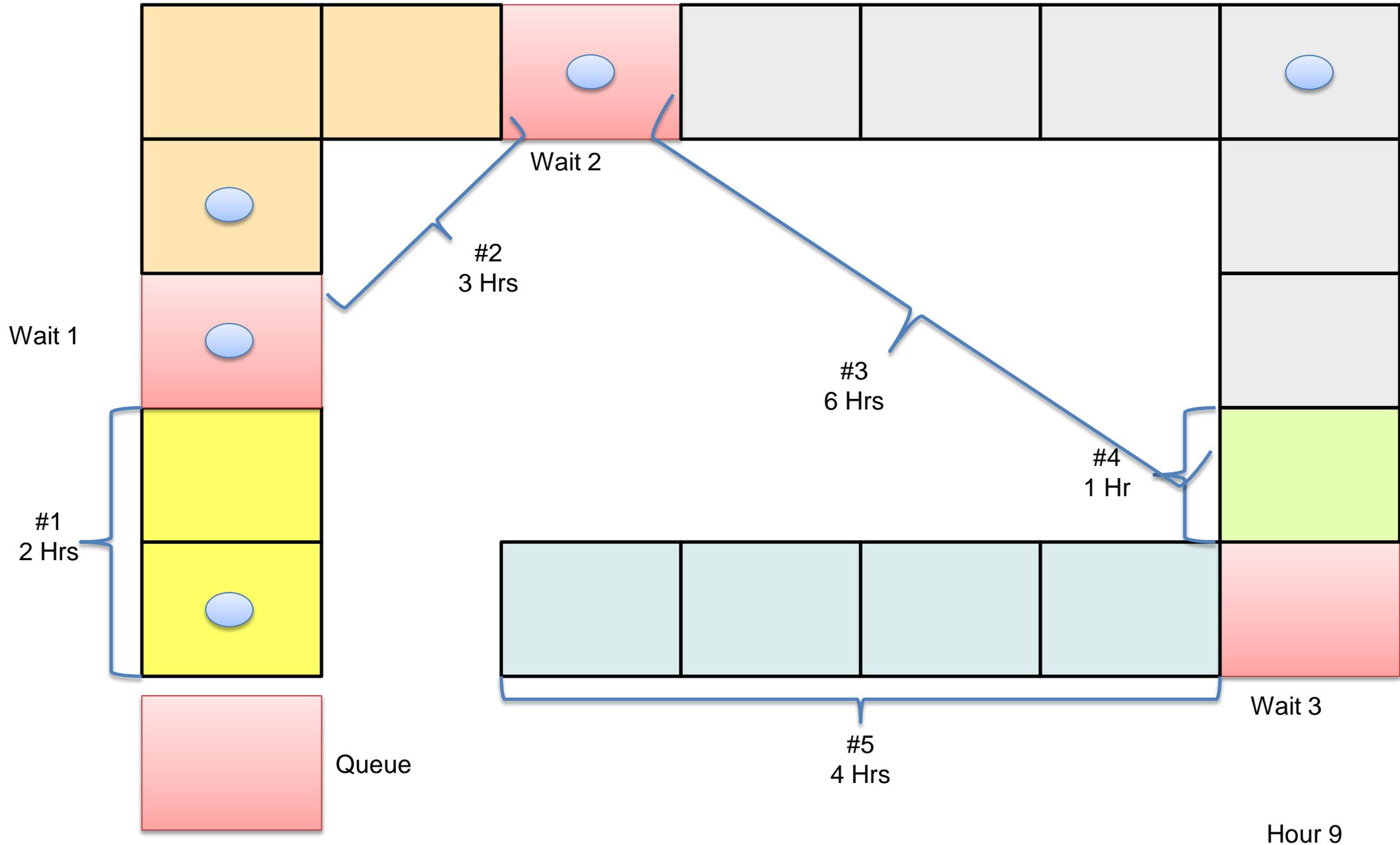


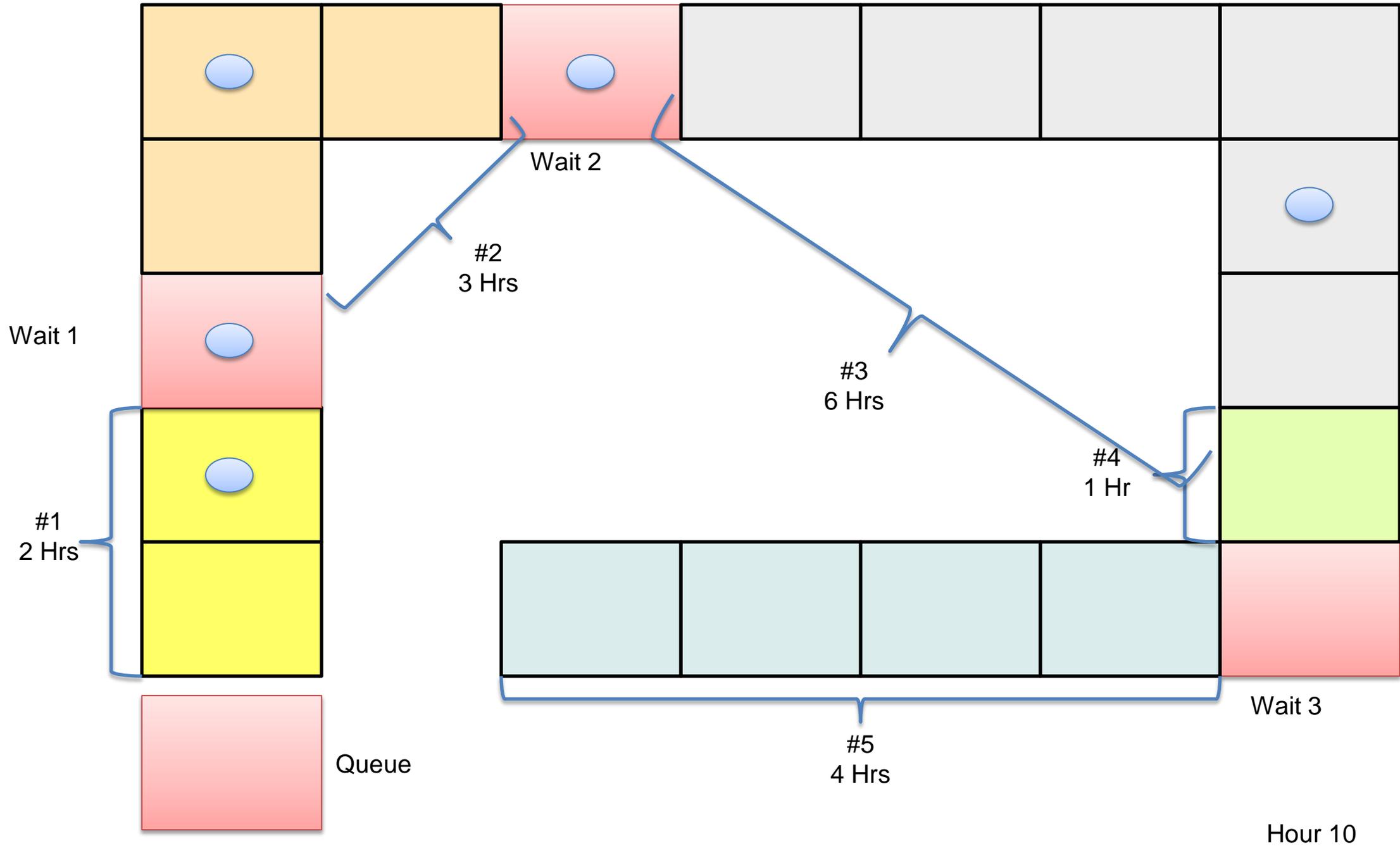


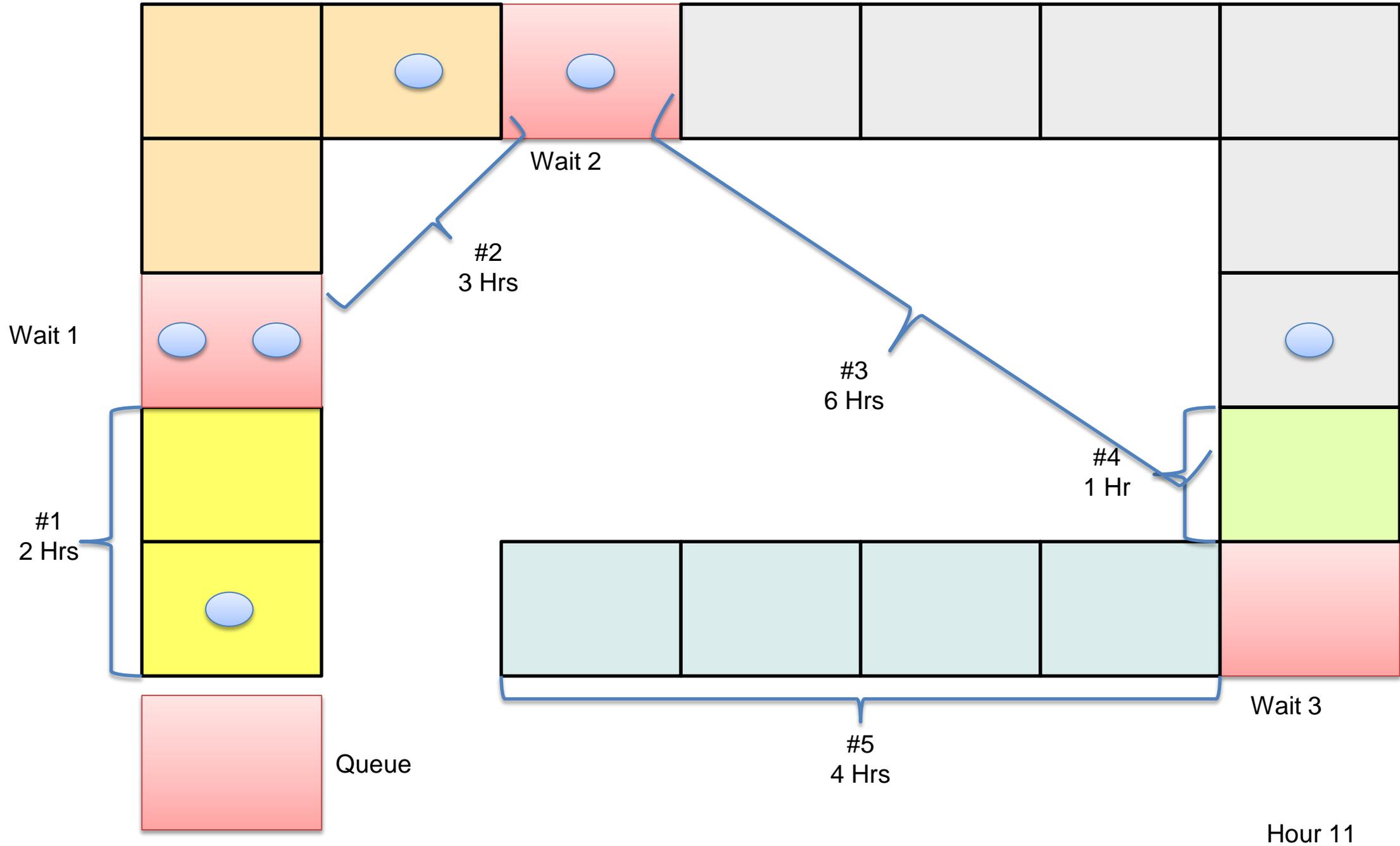


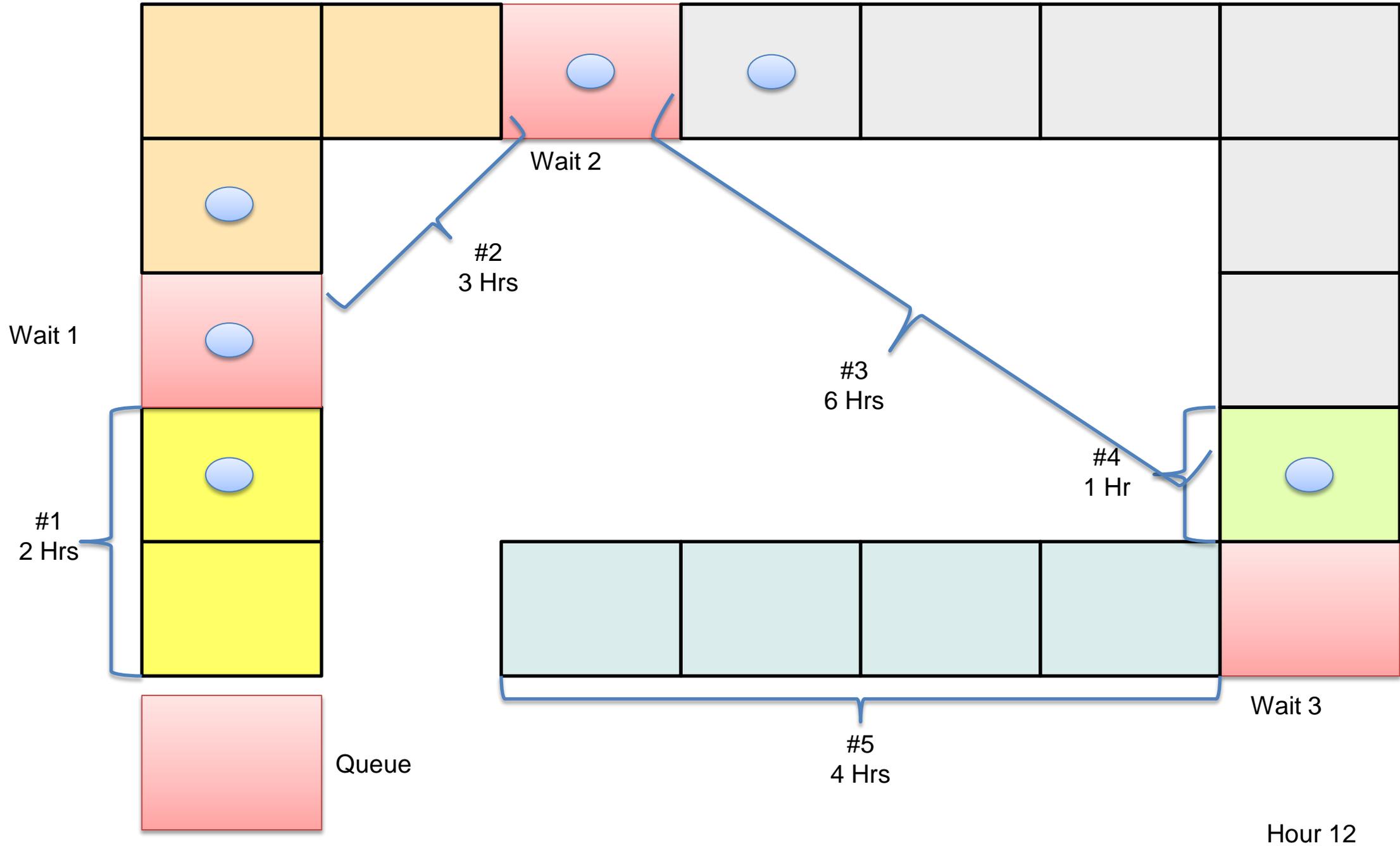


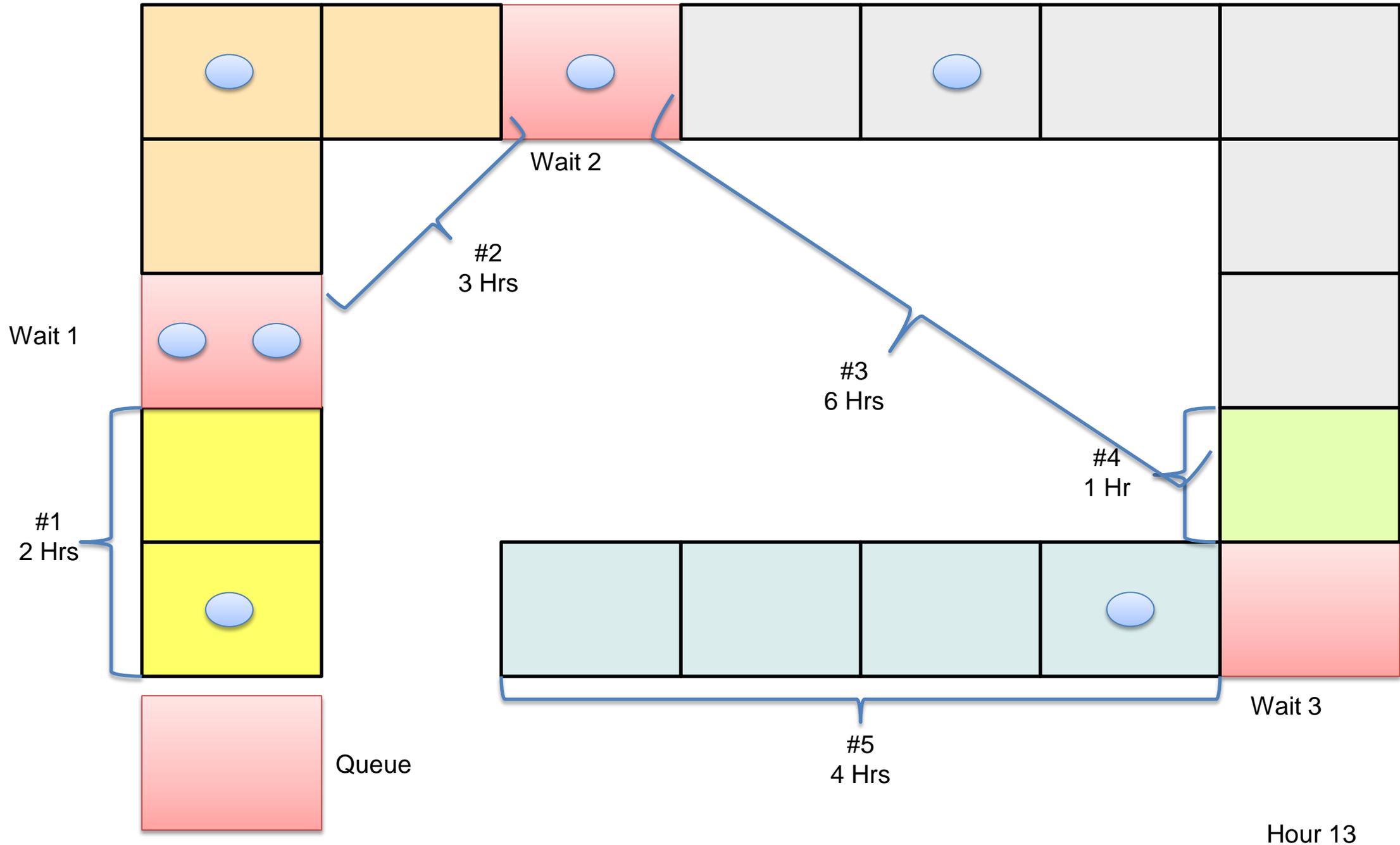


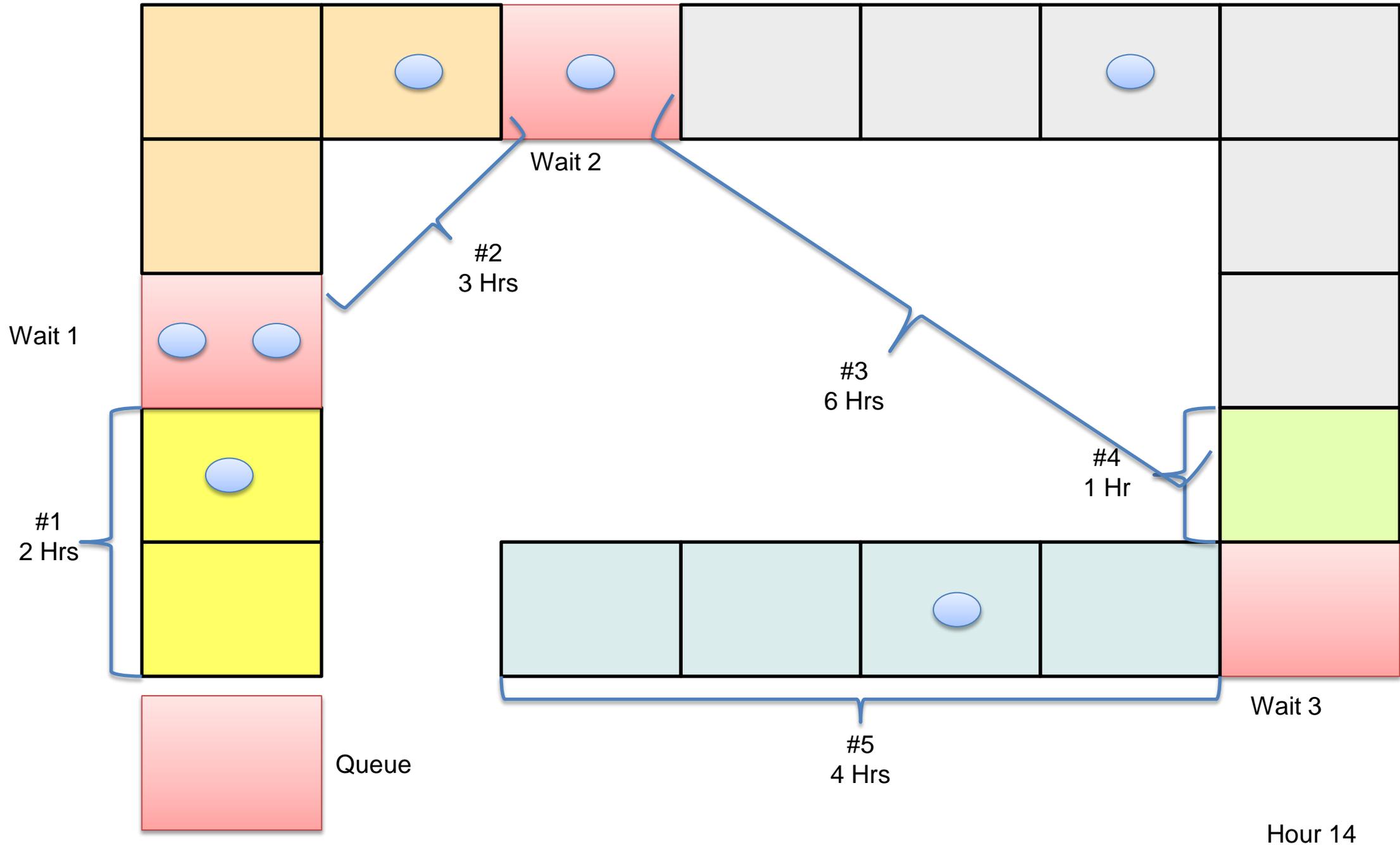


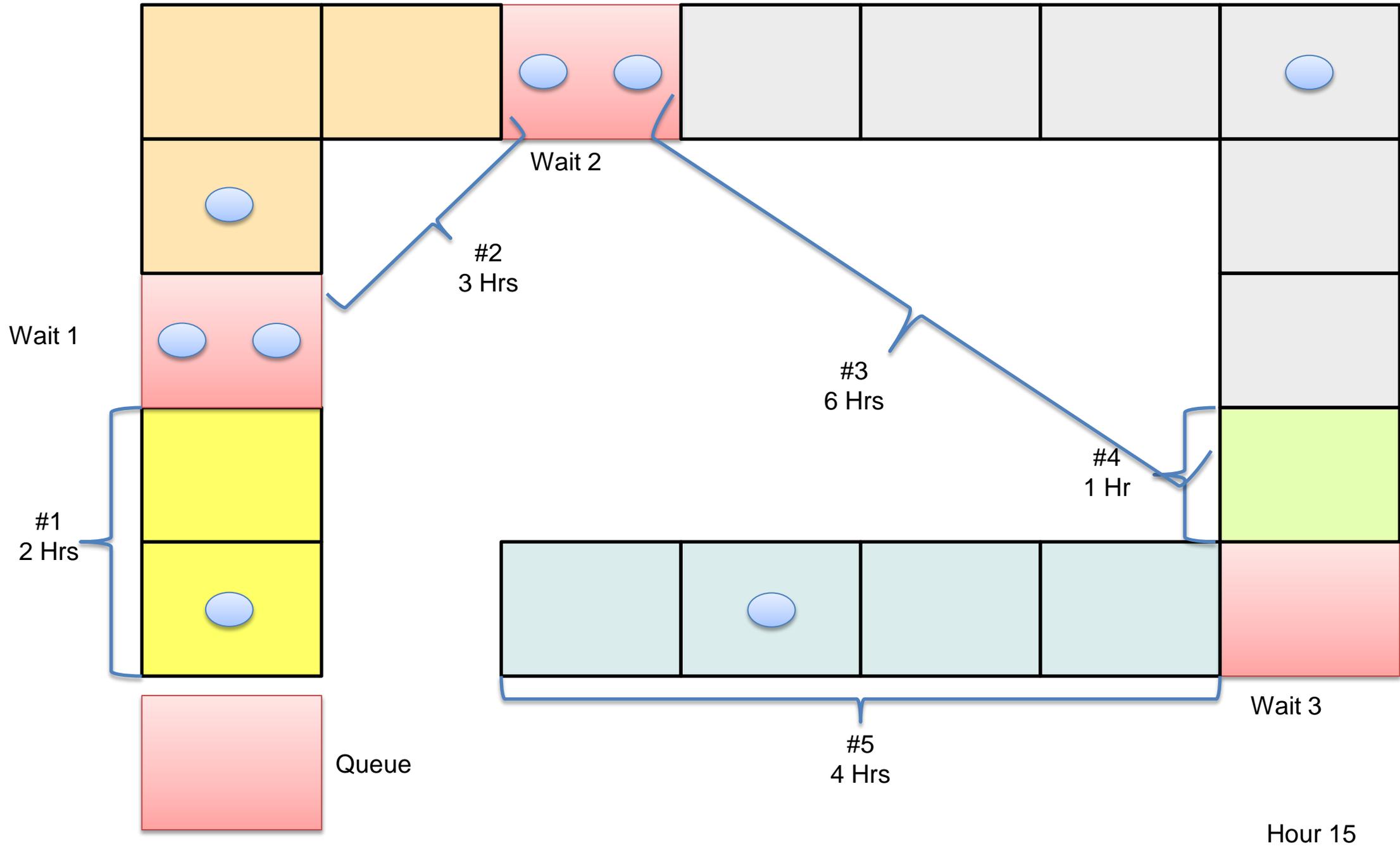


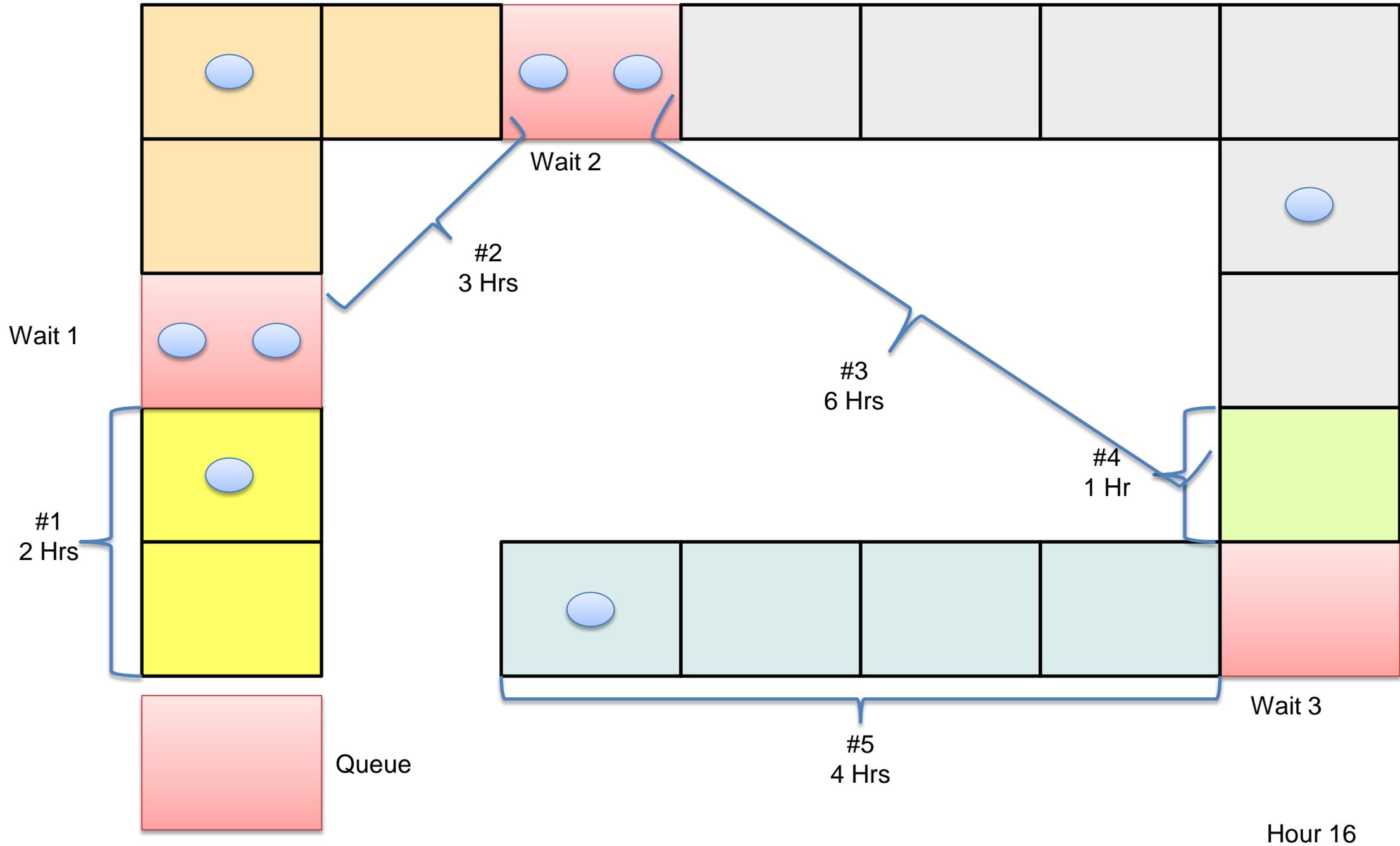


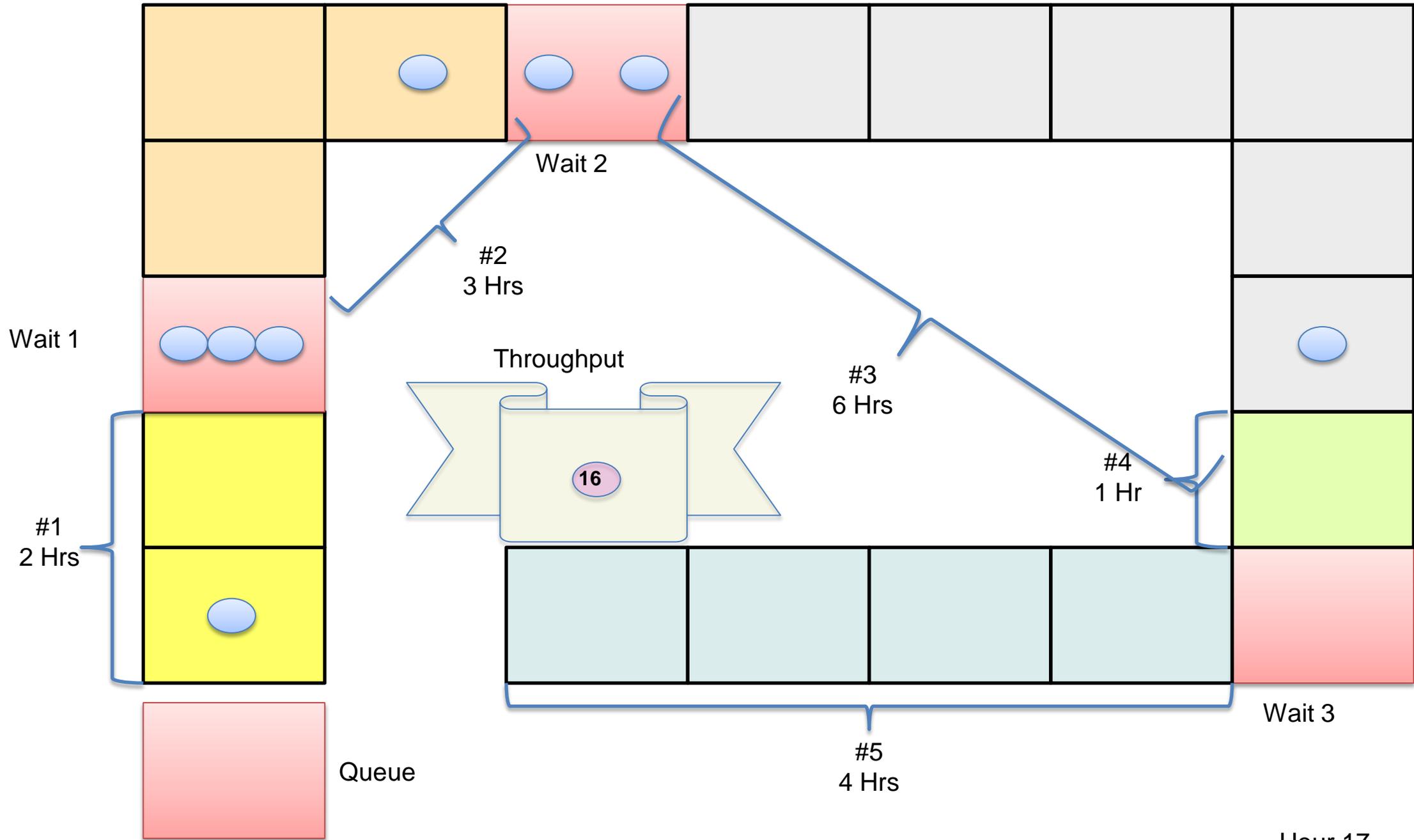




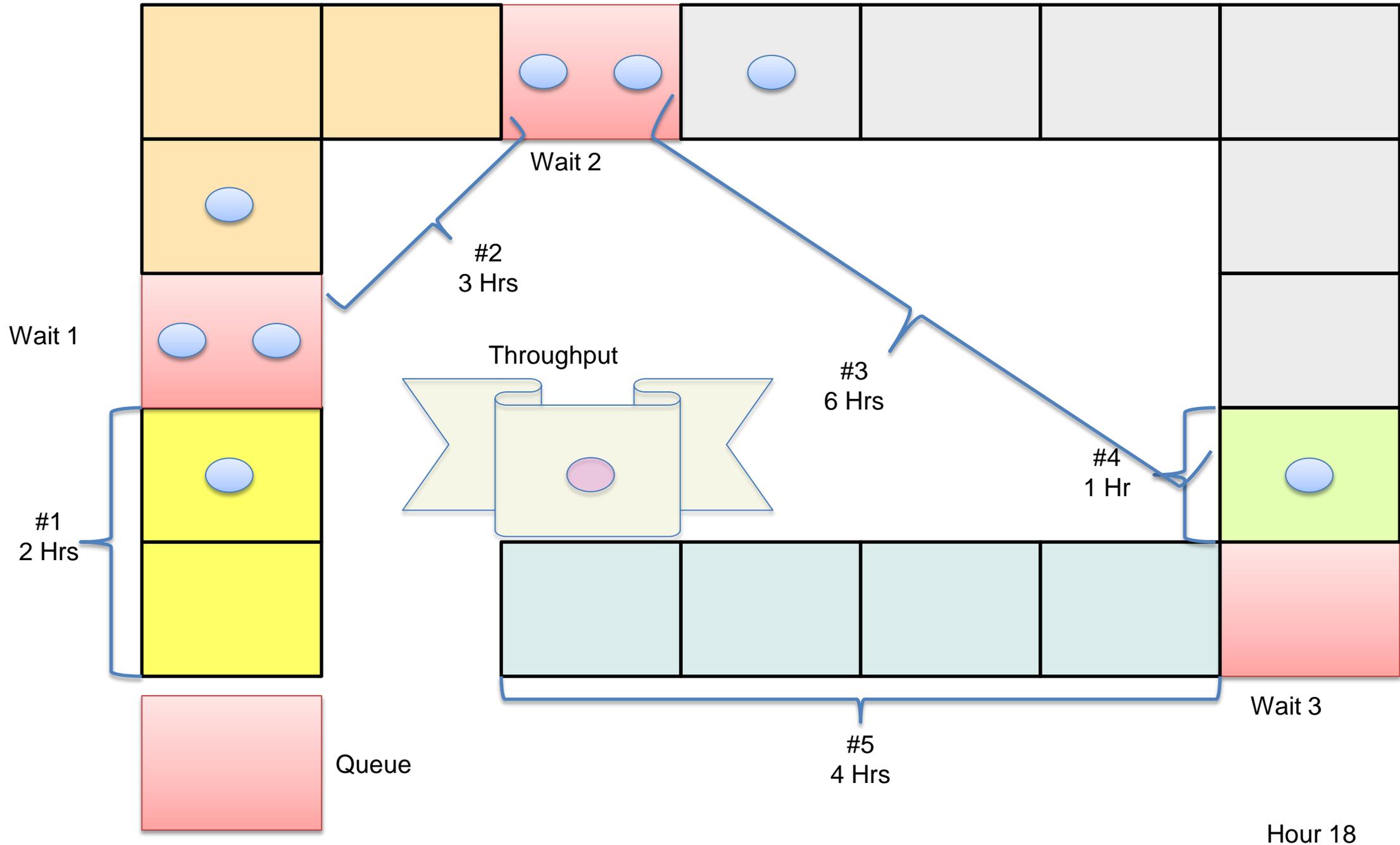


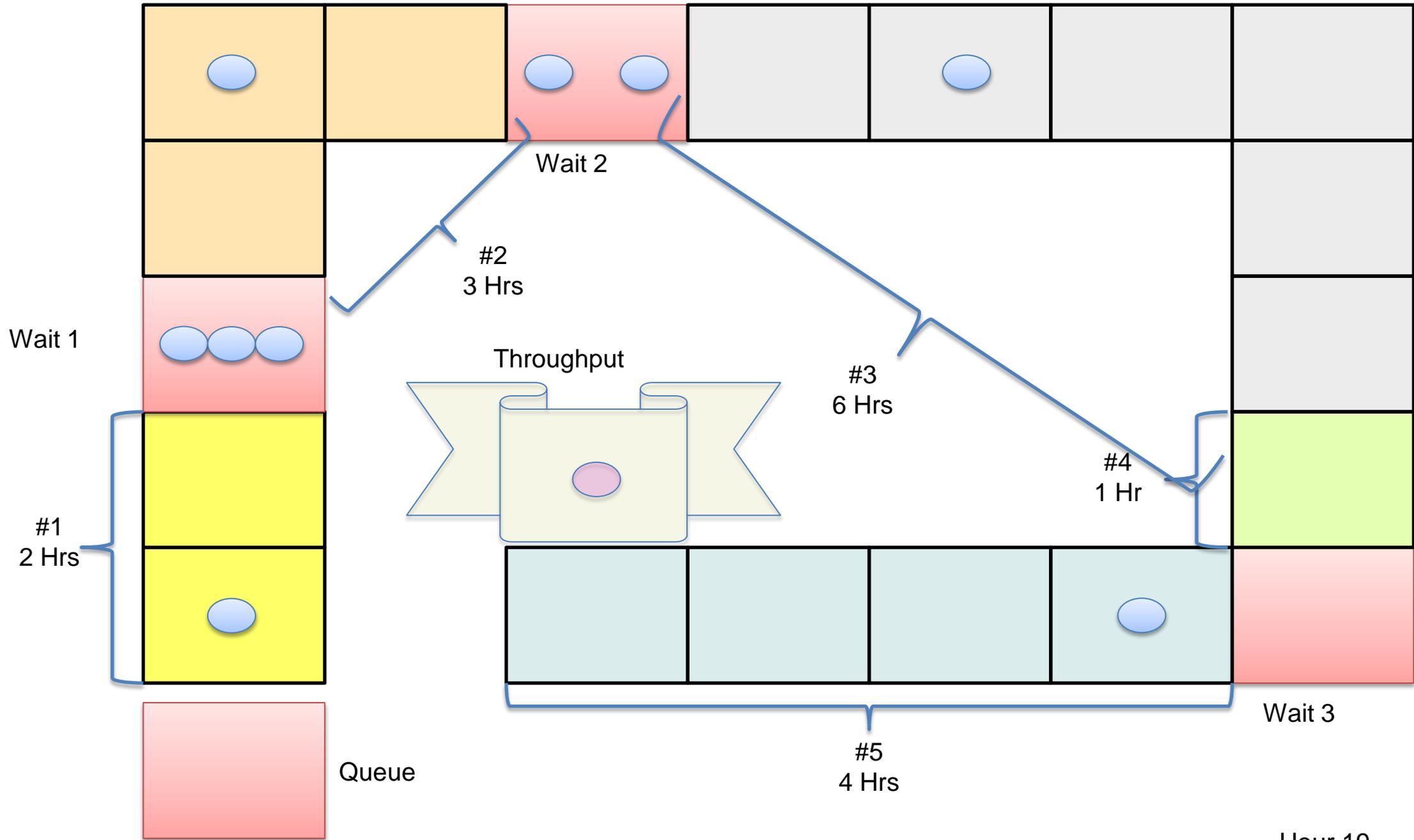




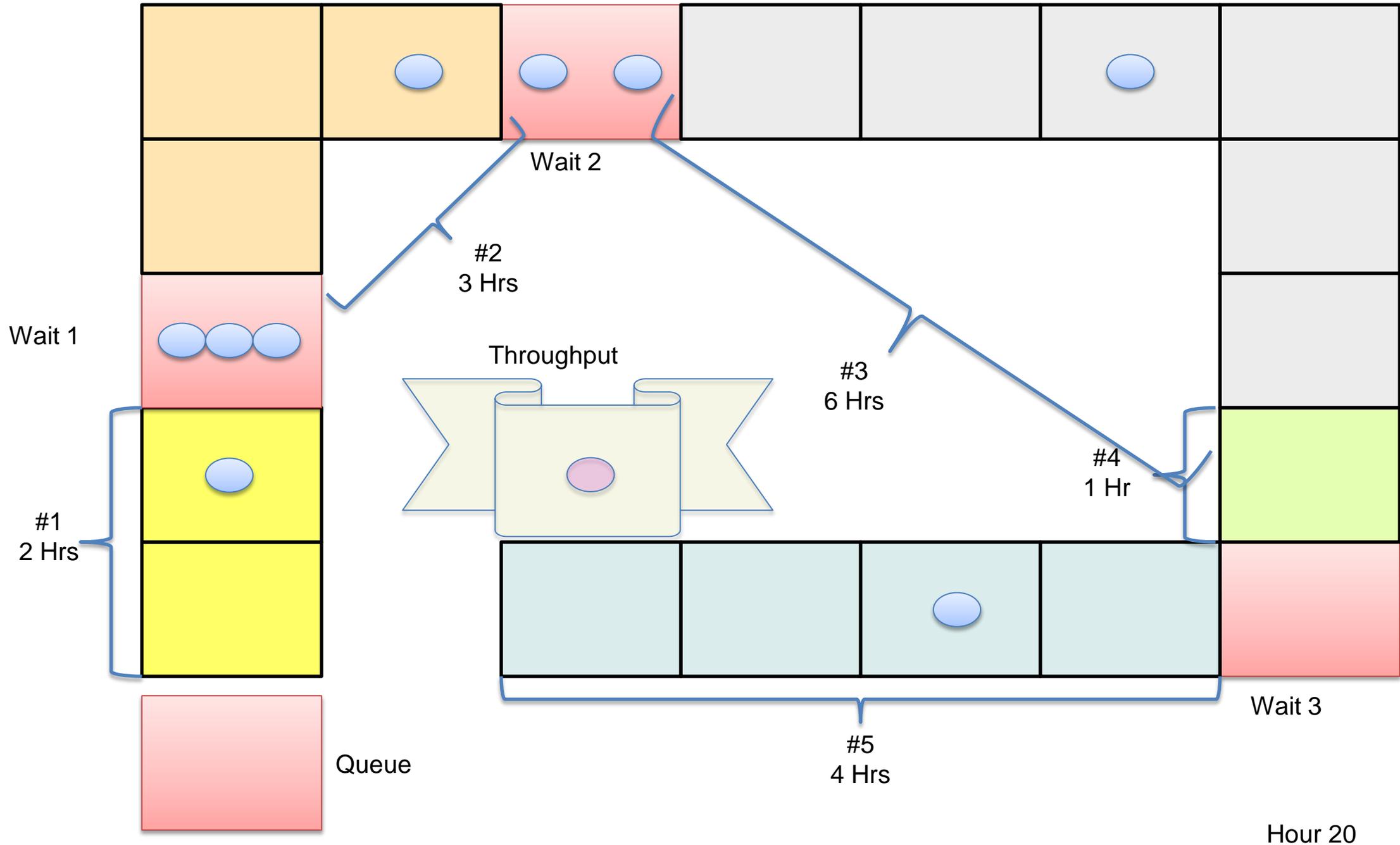


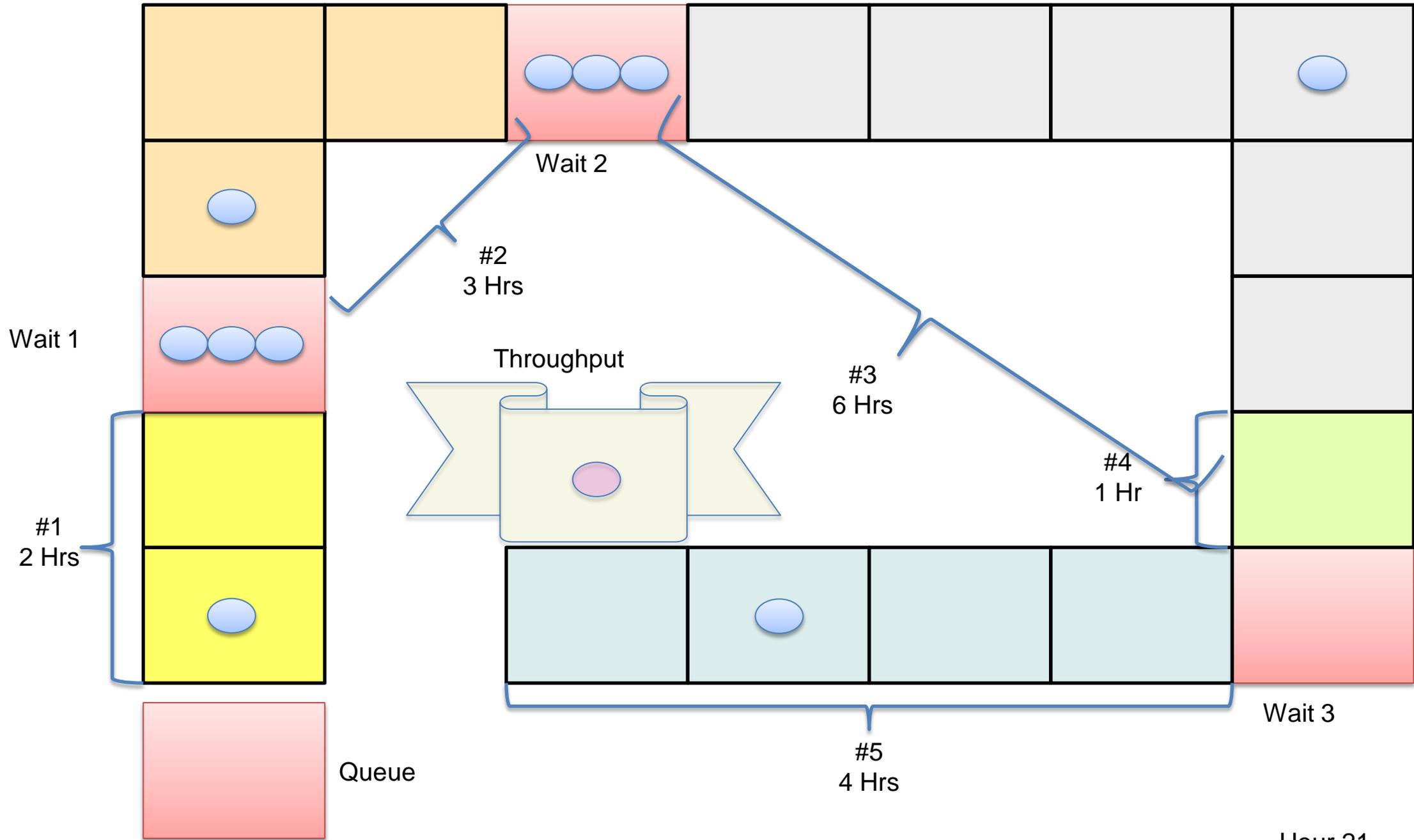
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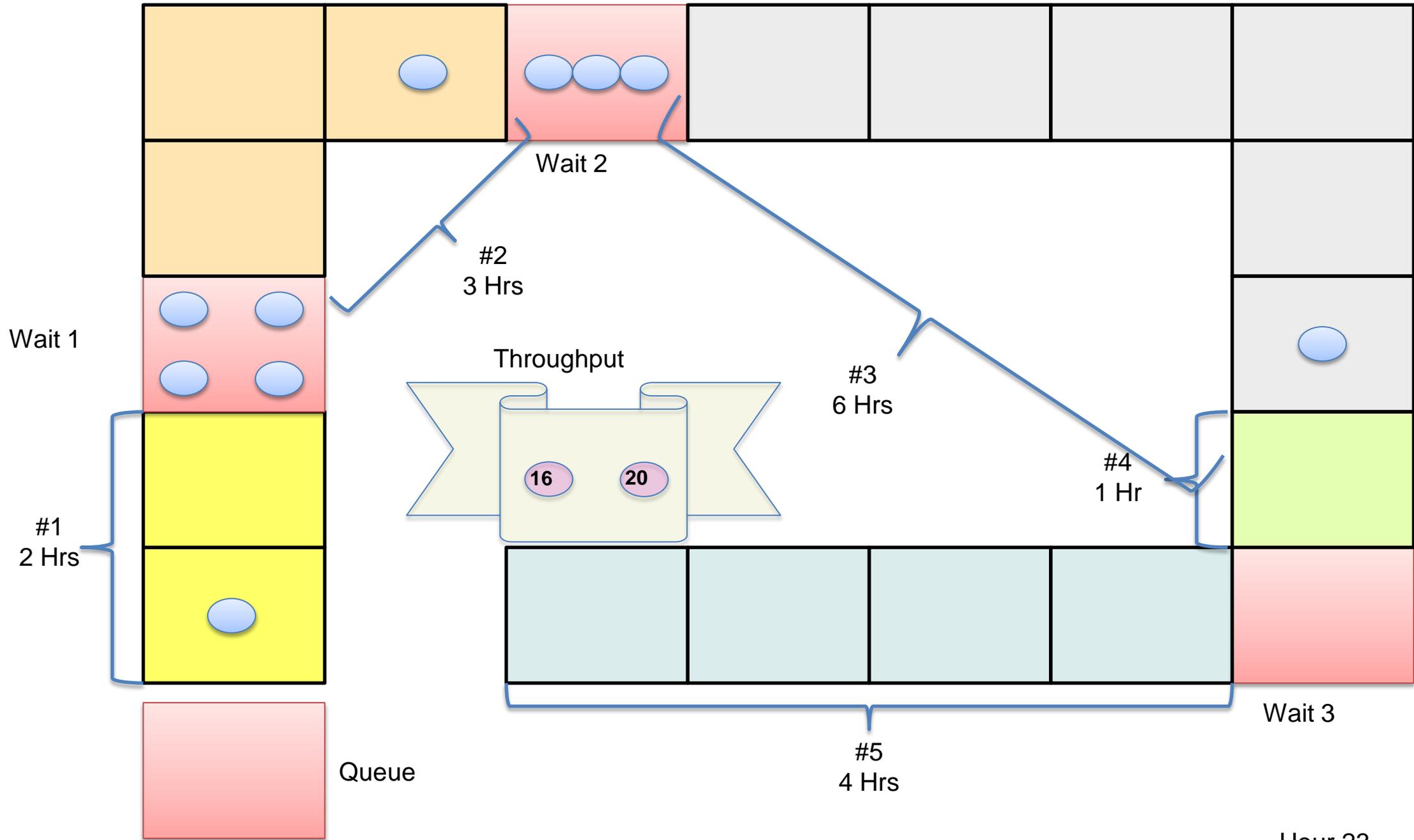


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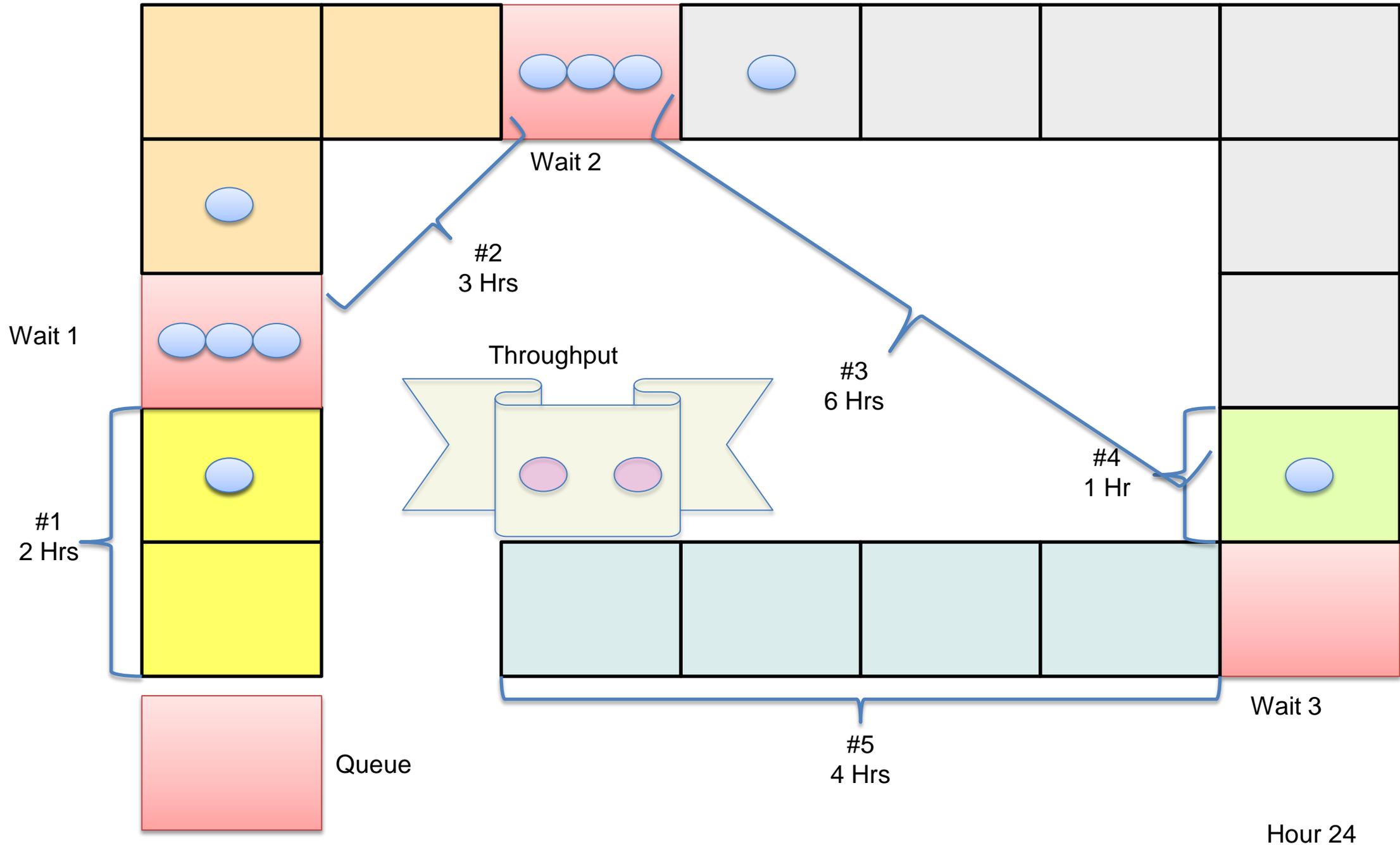


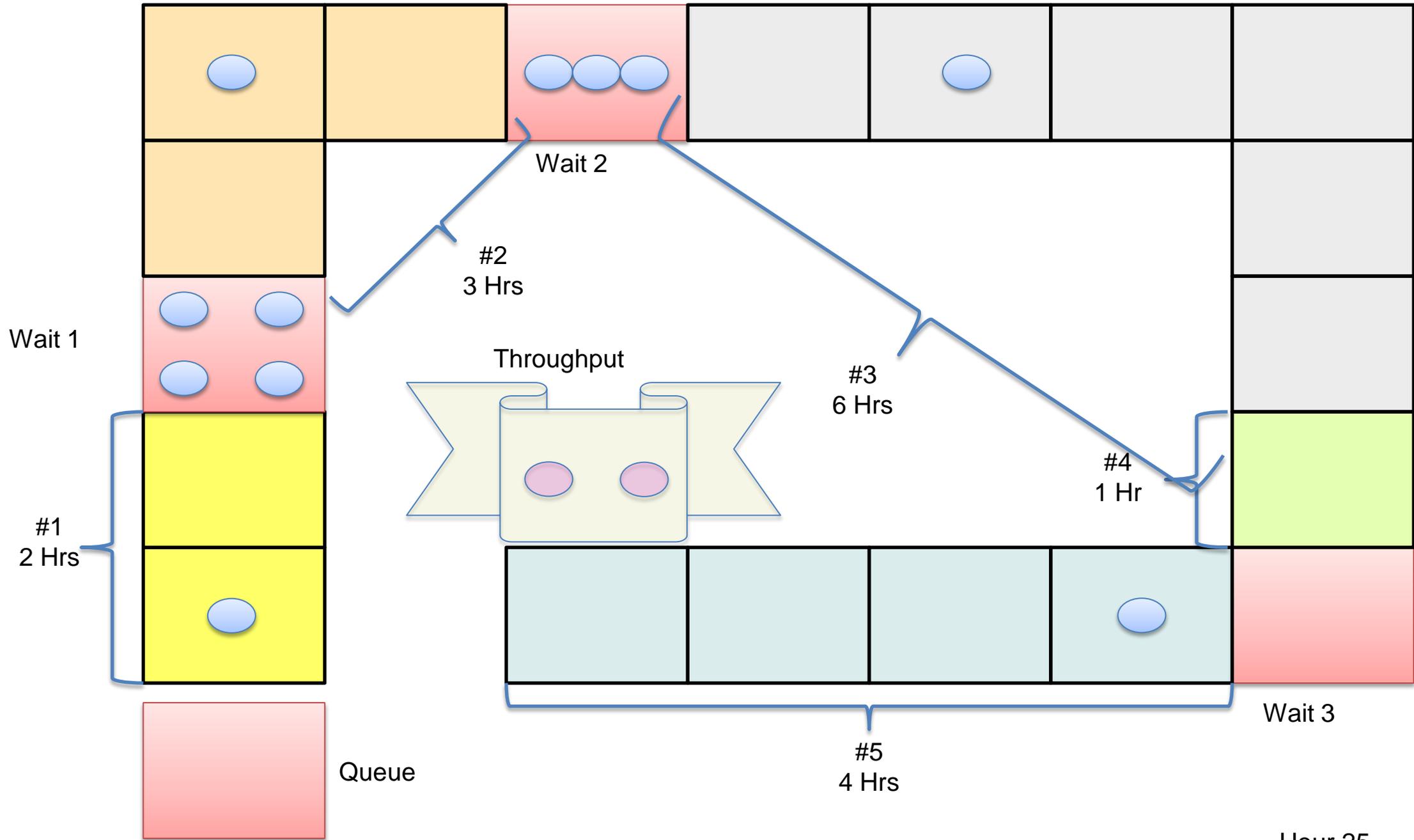


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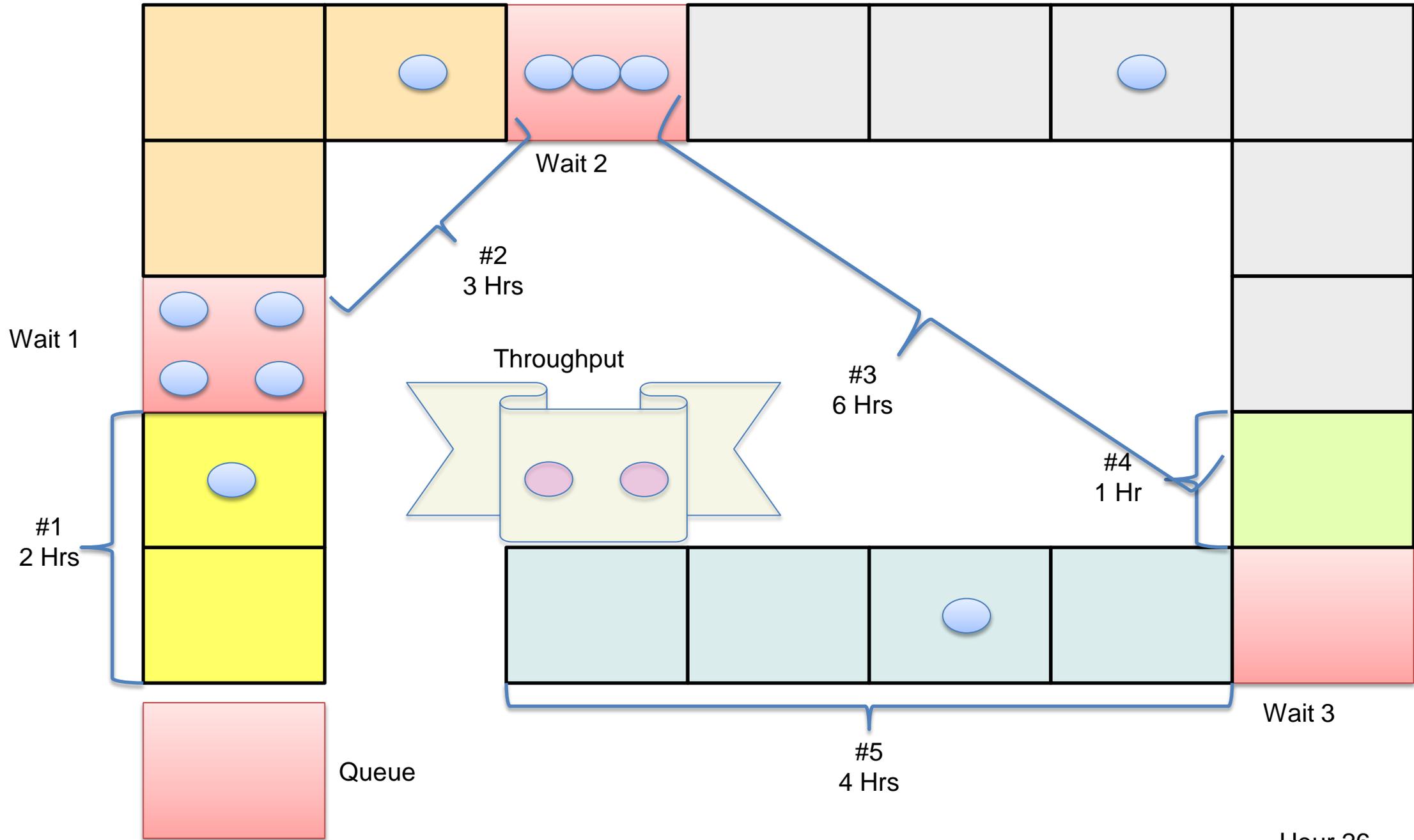


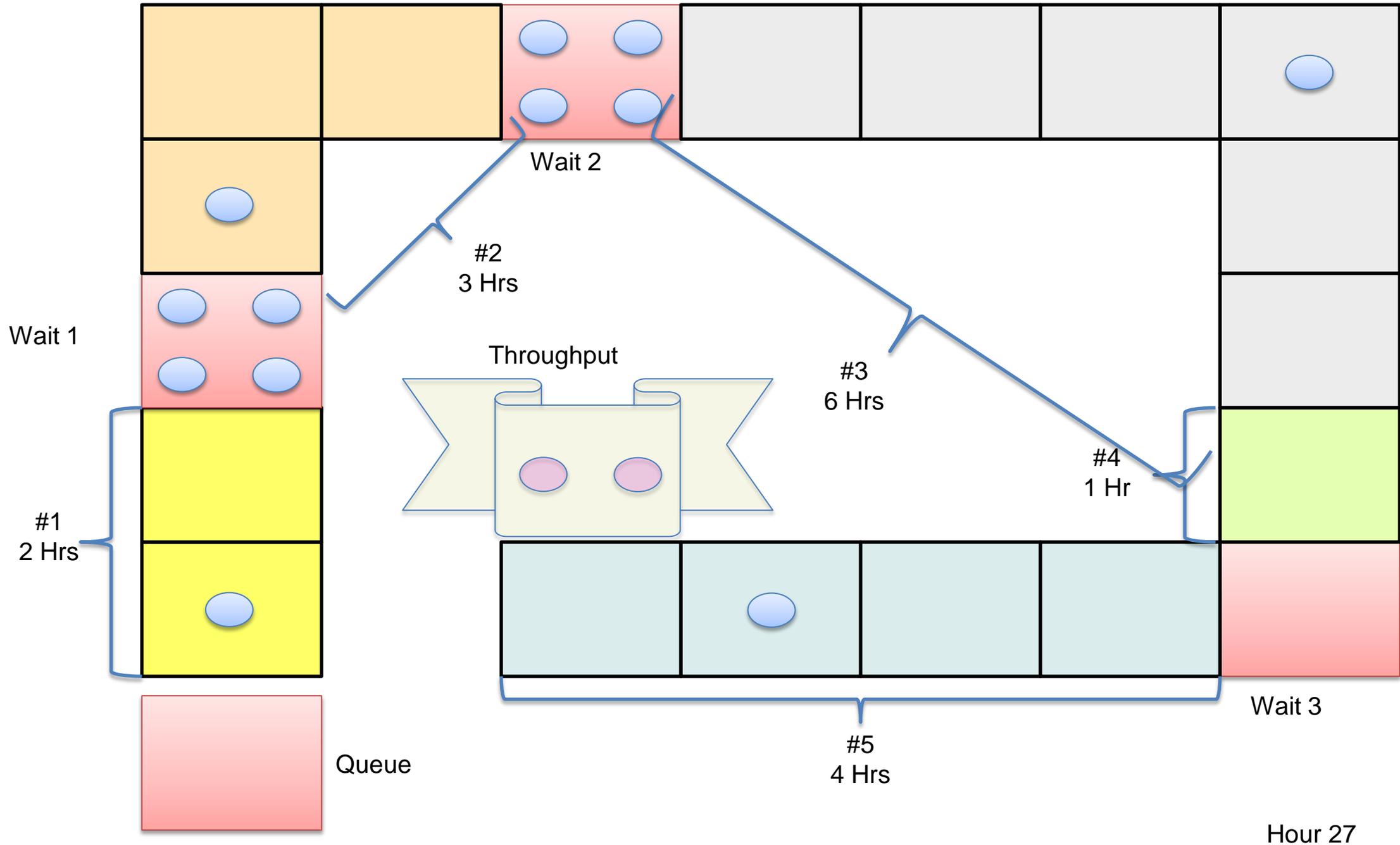
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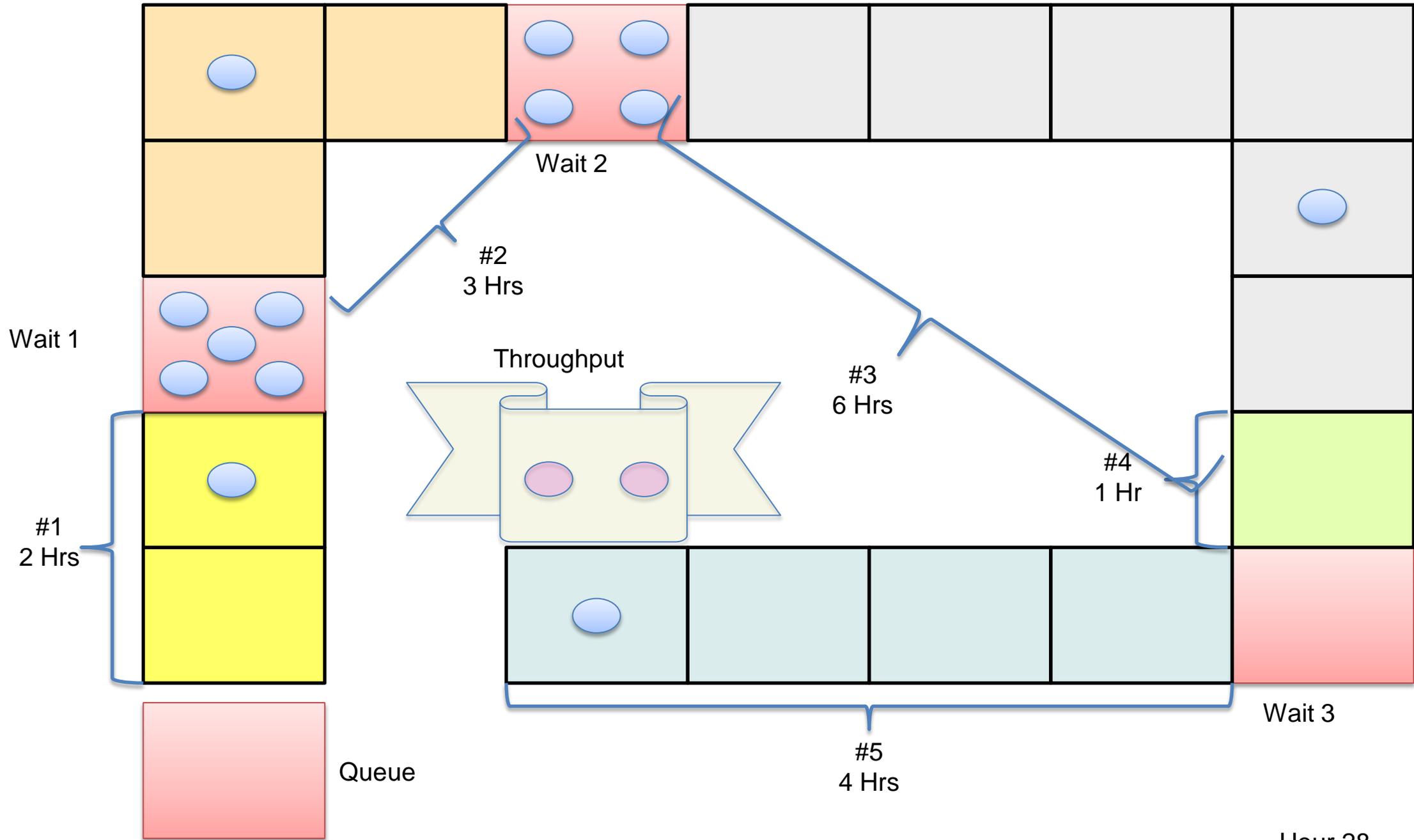




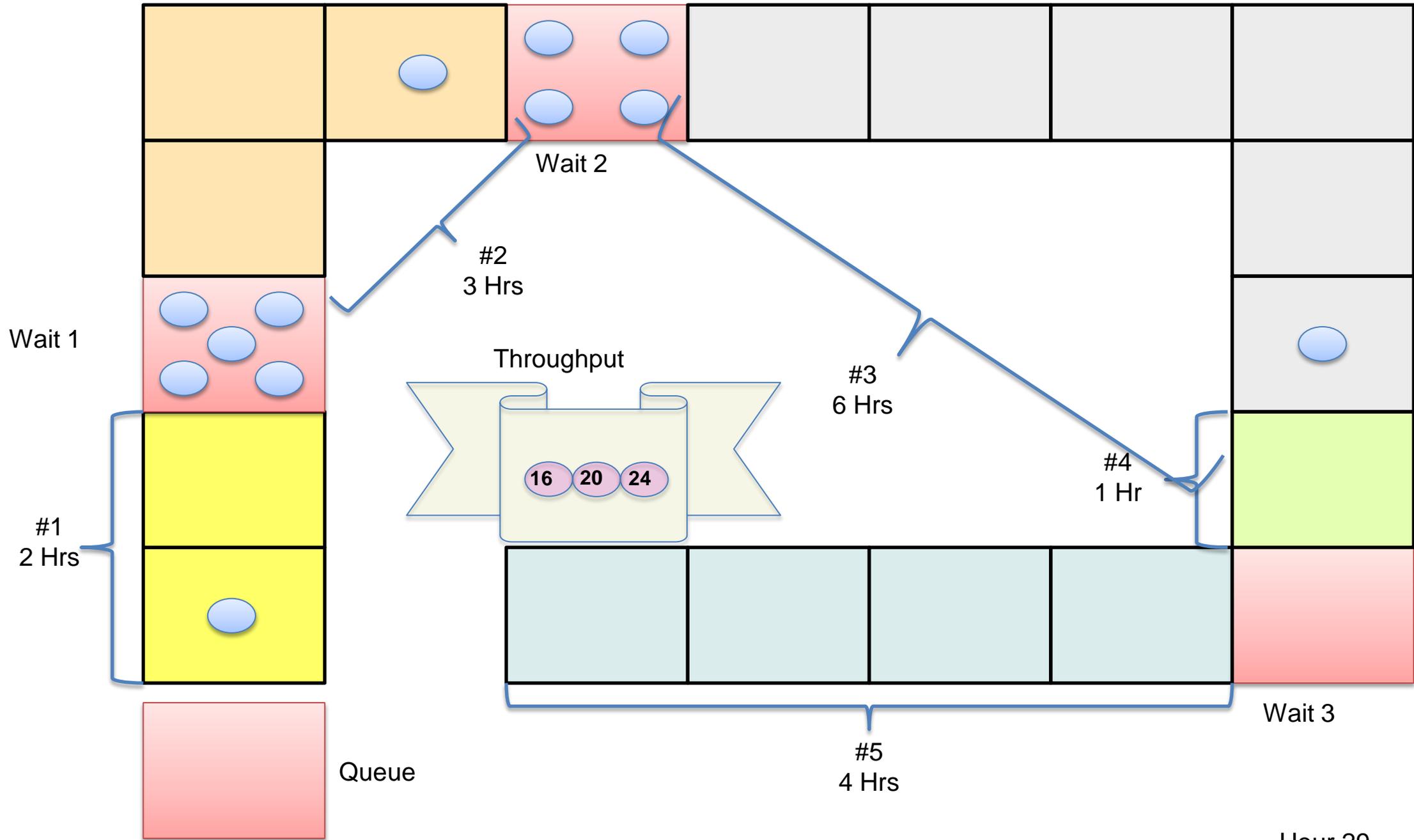
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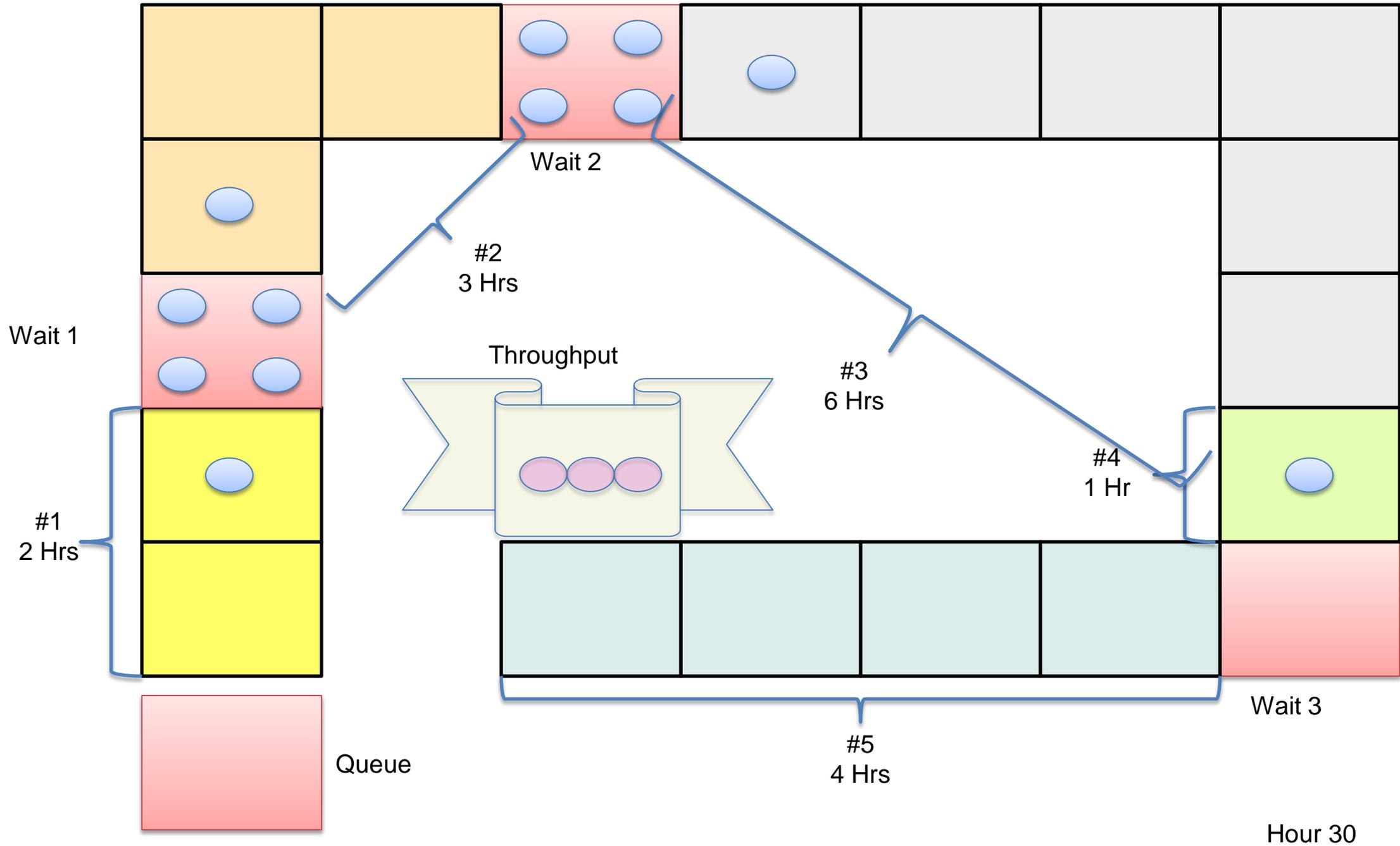


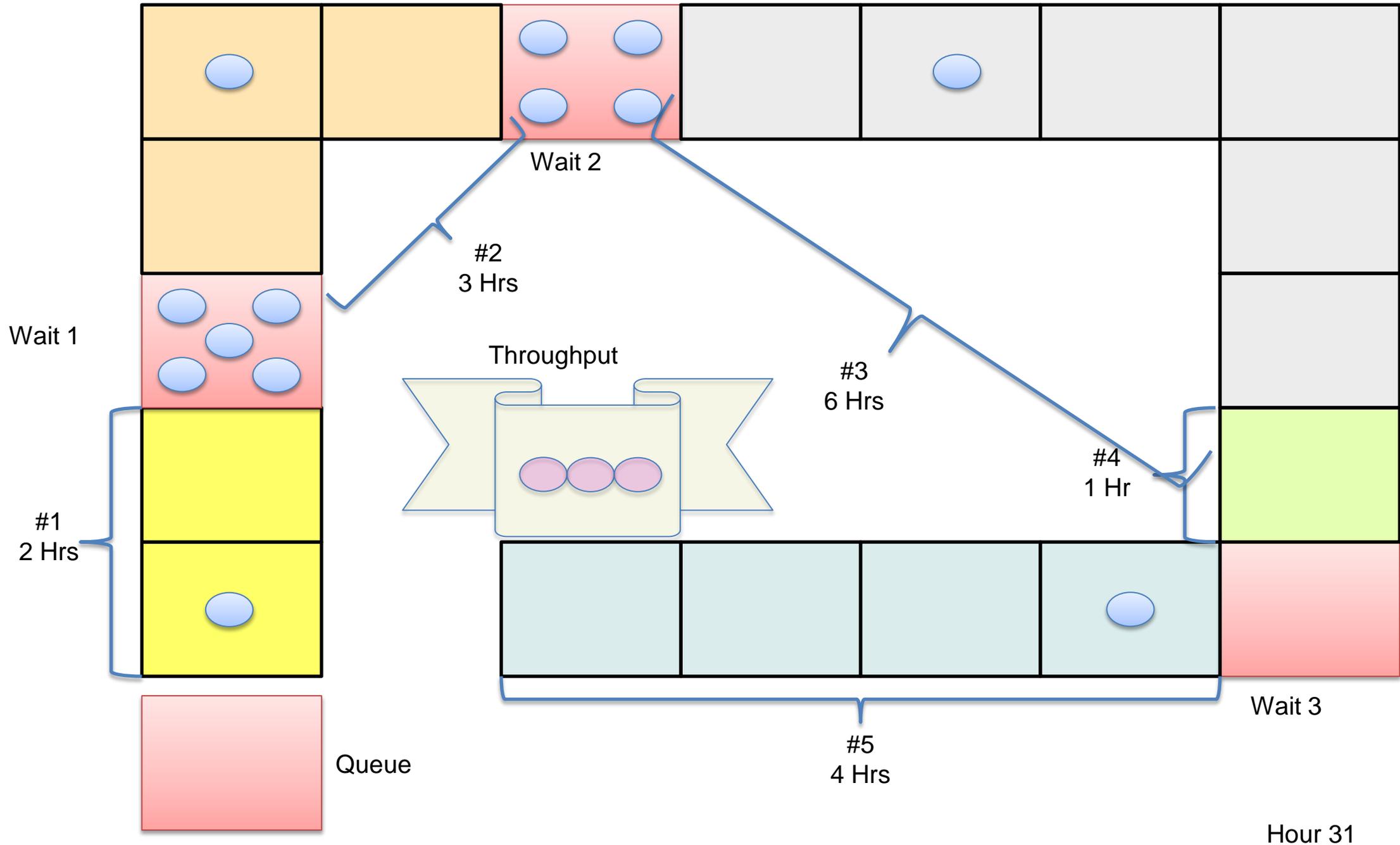


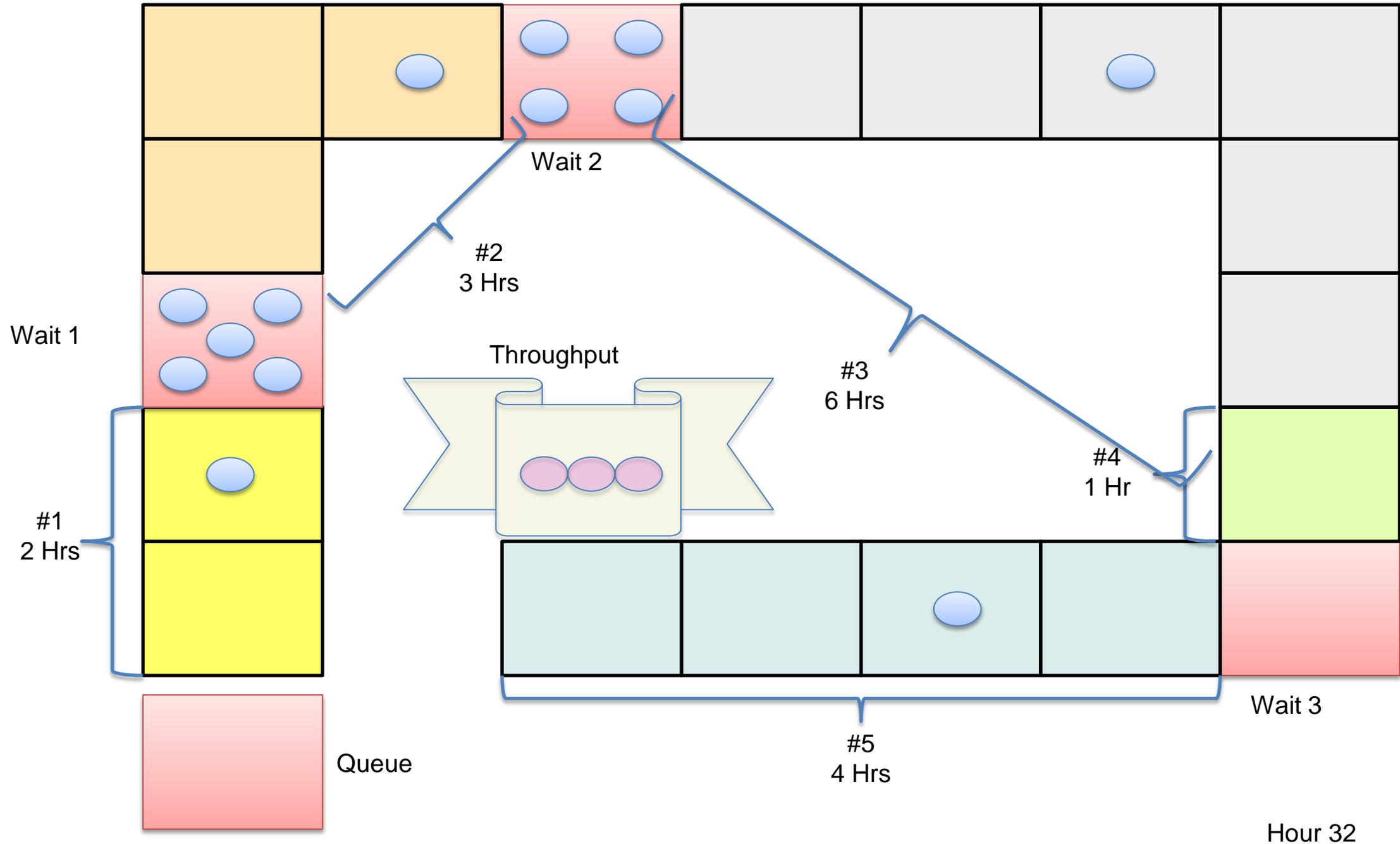
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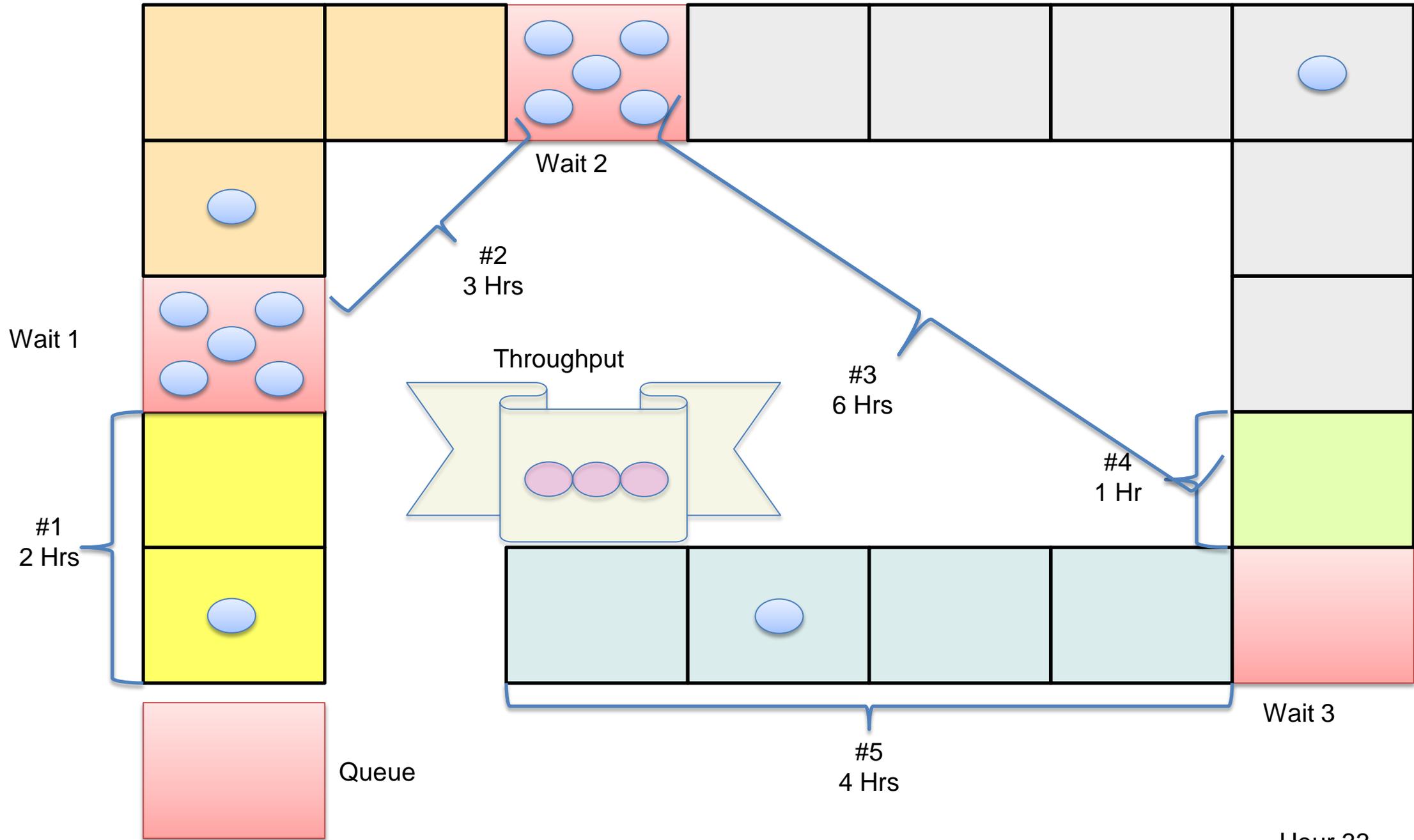


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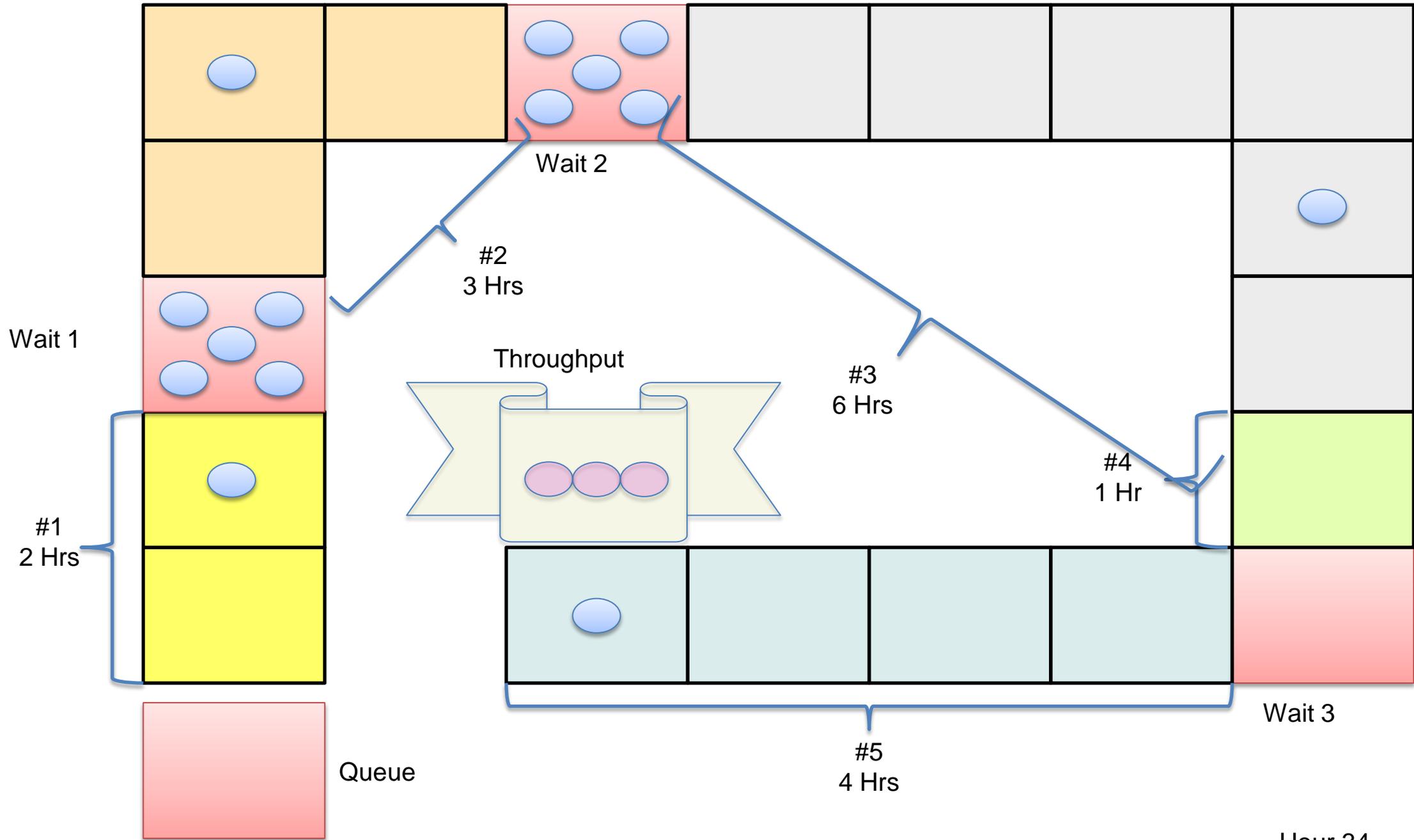




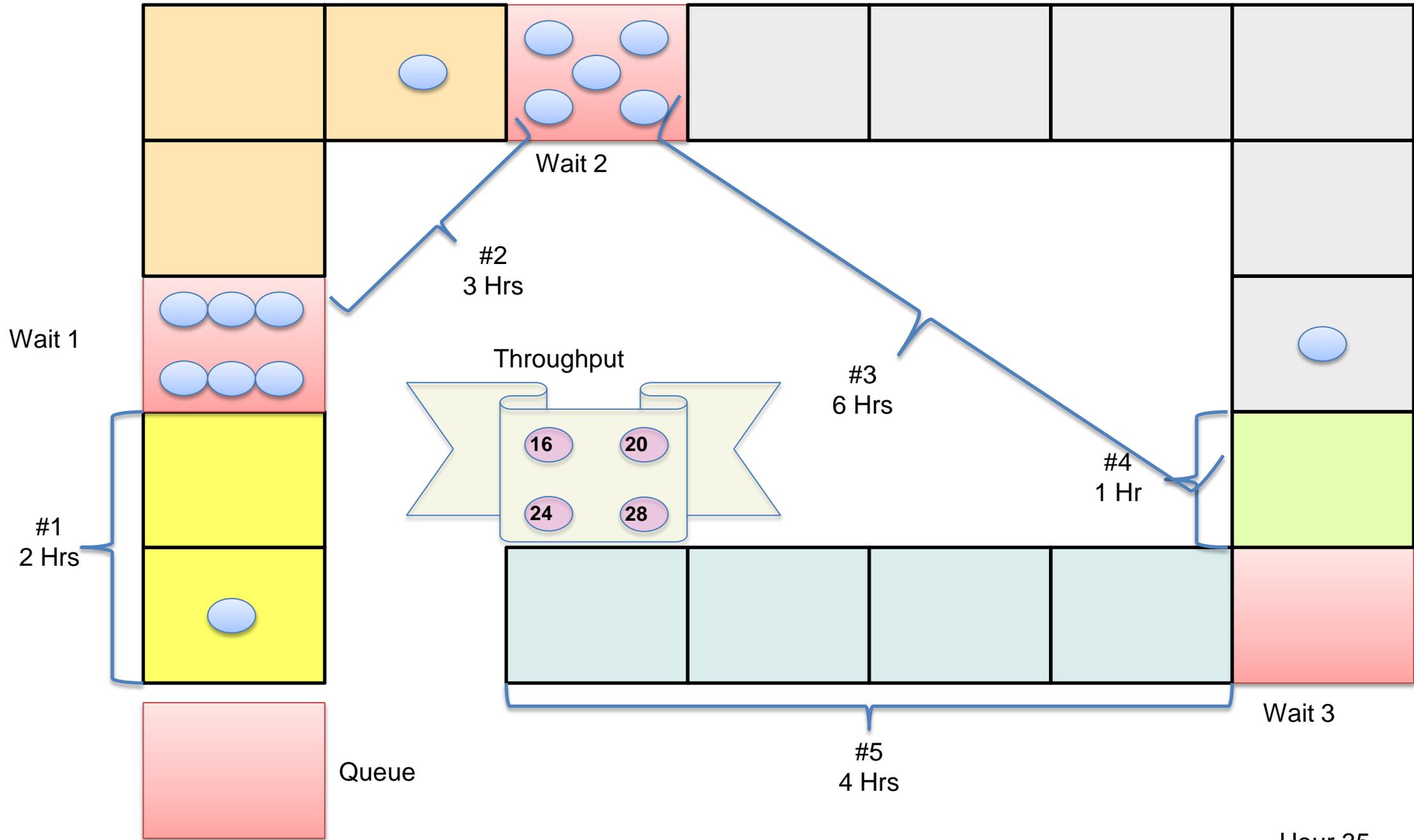


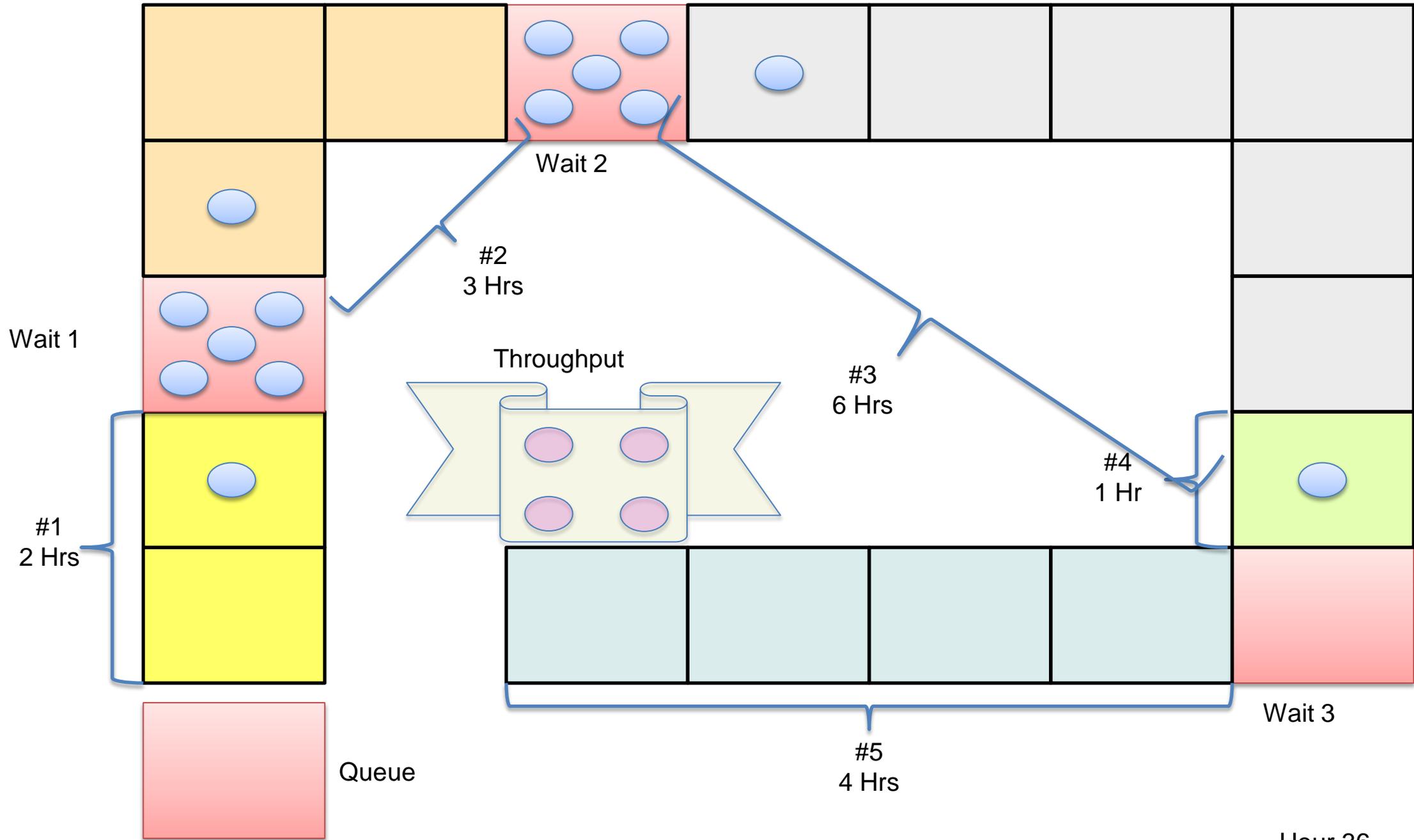


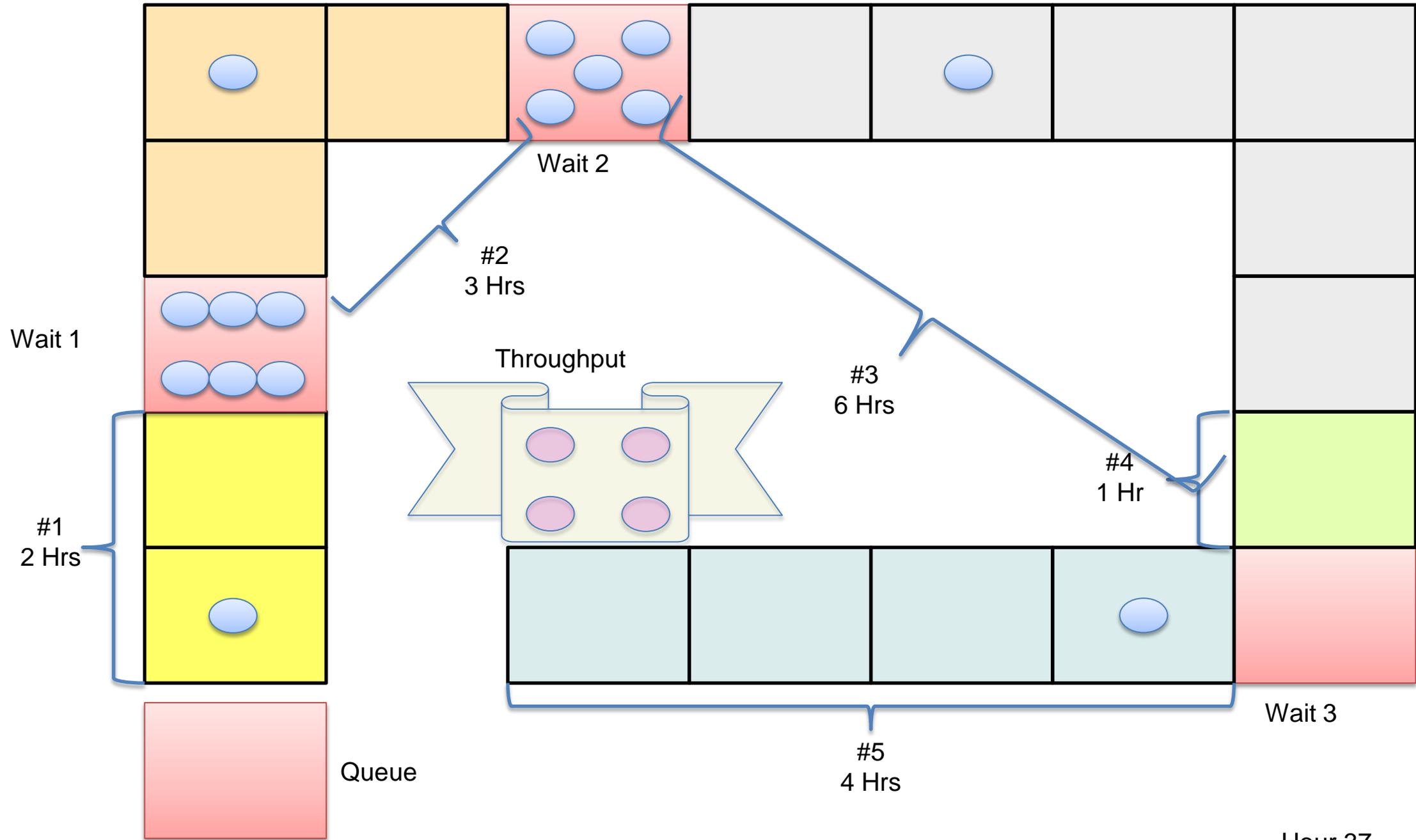
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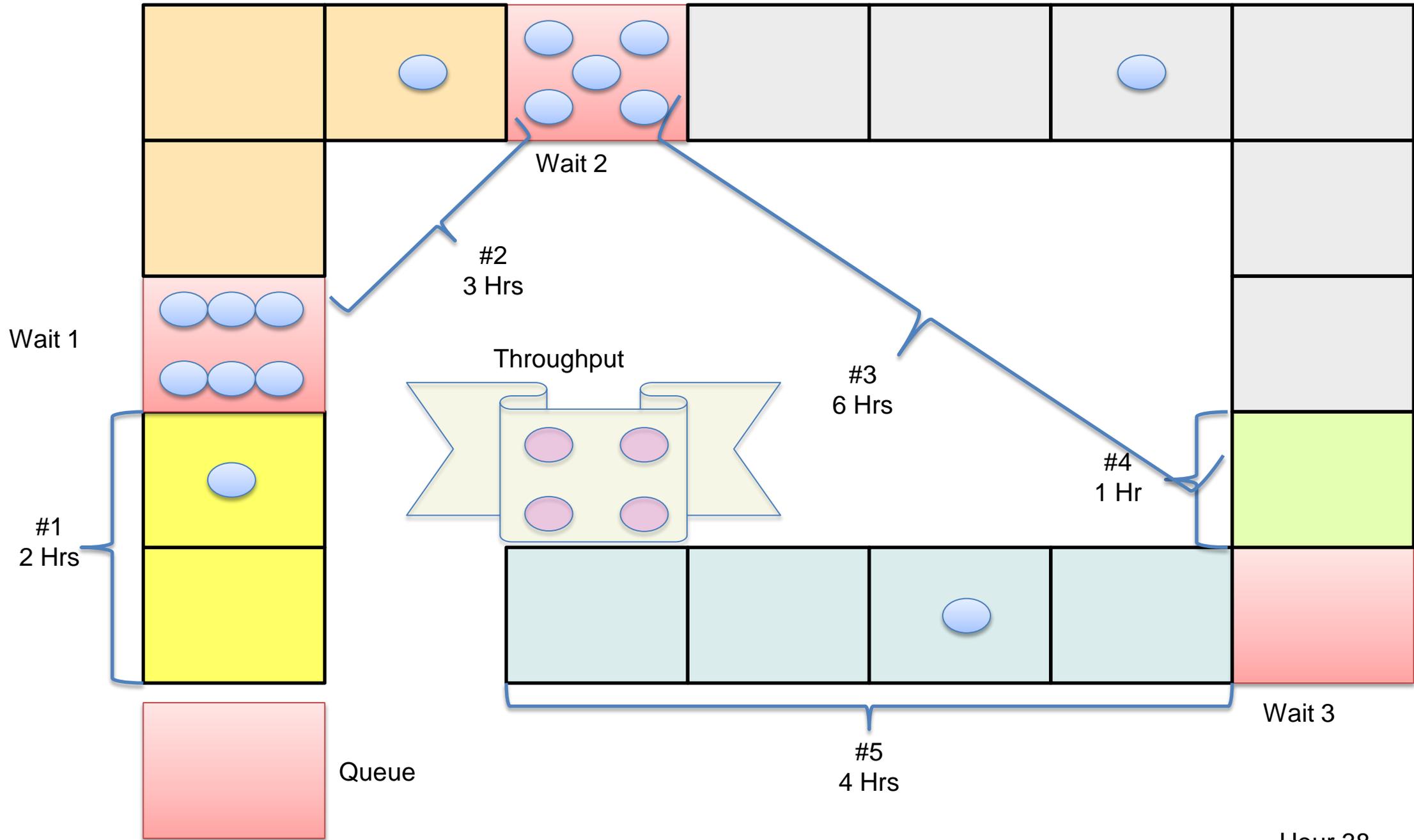
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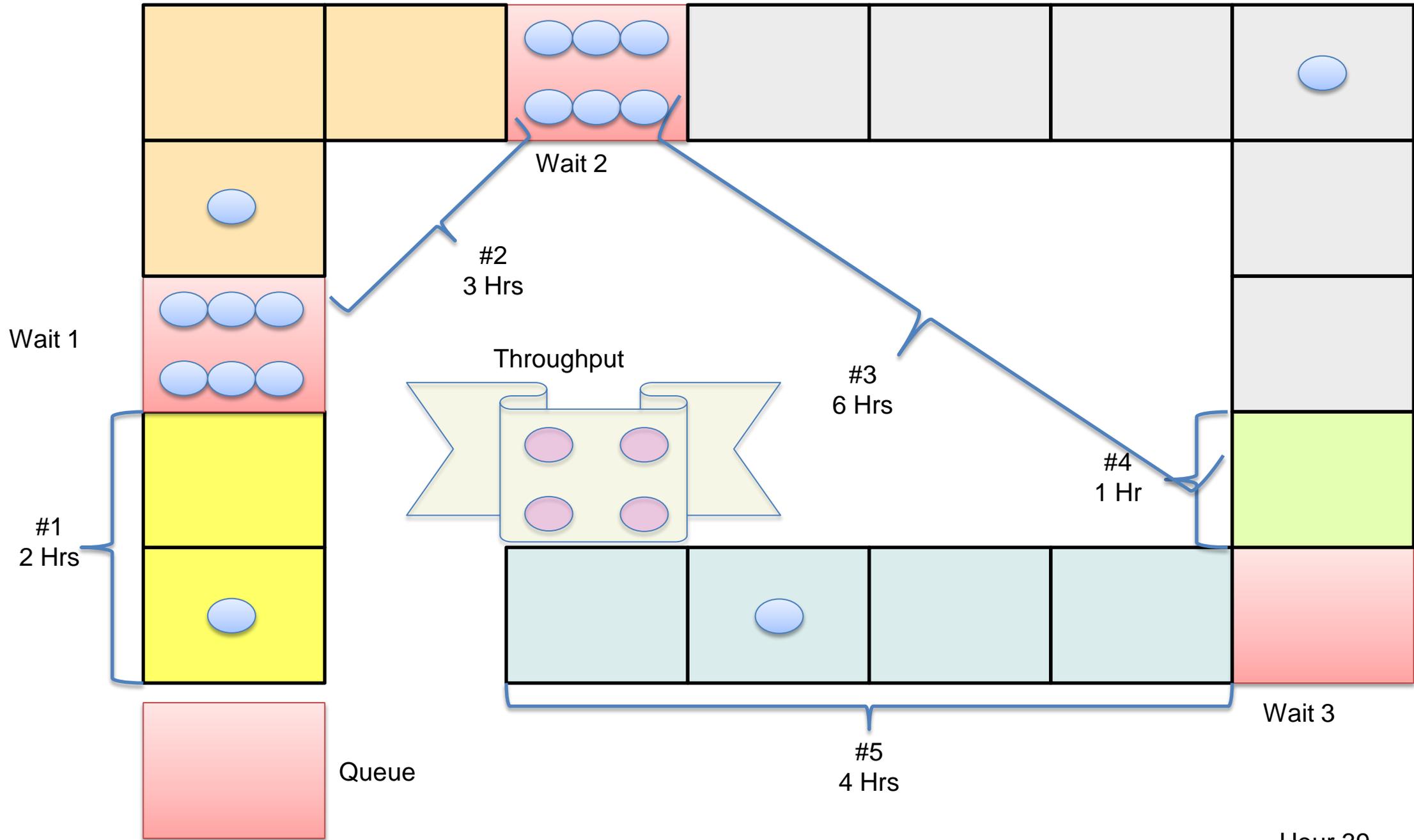


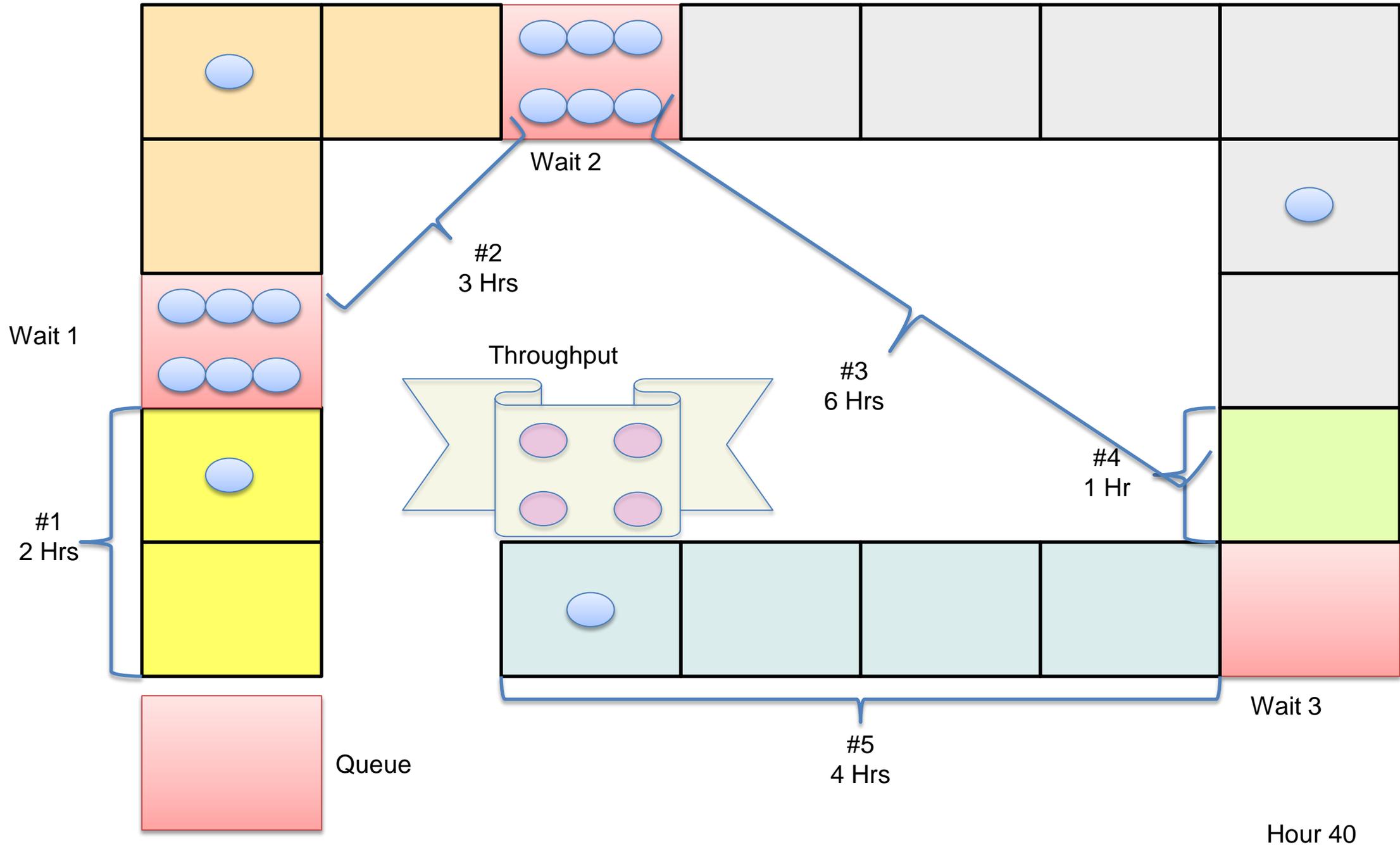




Hour 37







Wait 1

#1
2 Hrs

Queue

Wait 2

#2
3 Hrs

Throughput

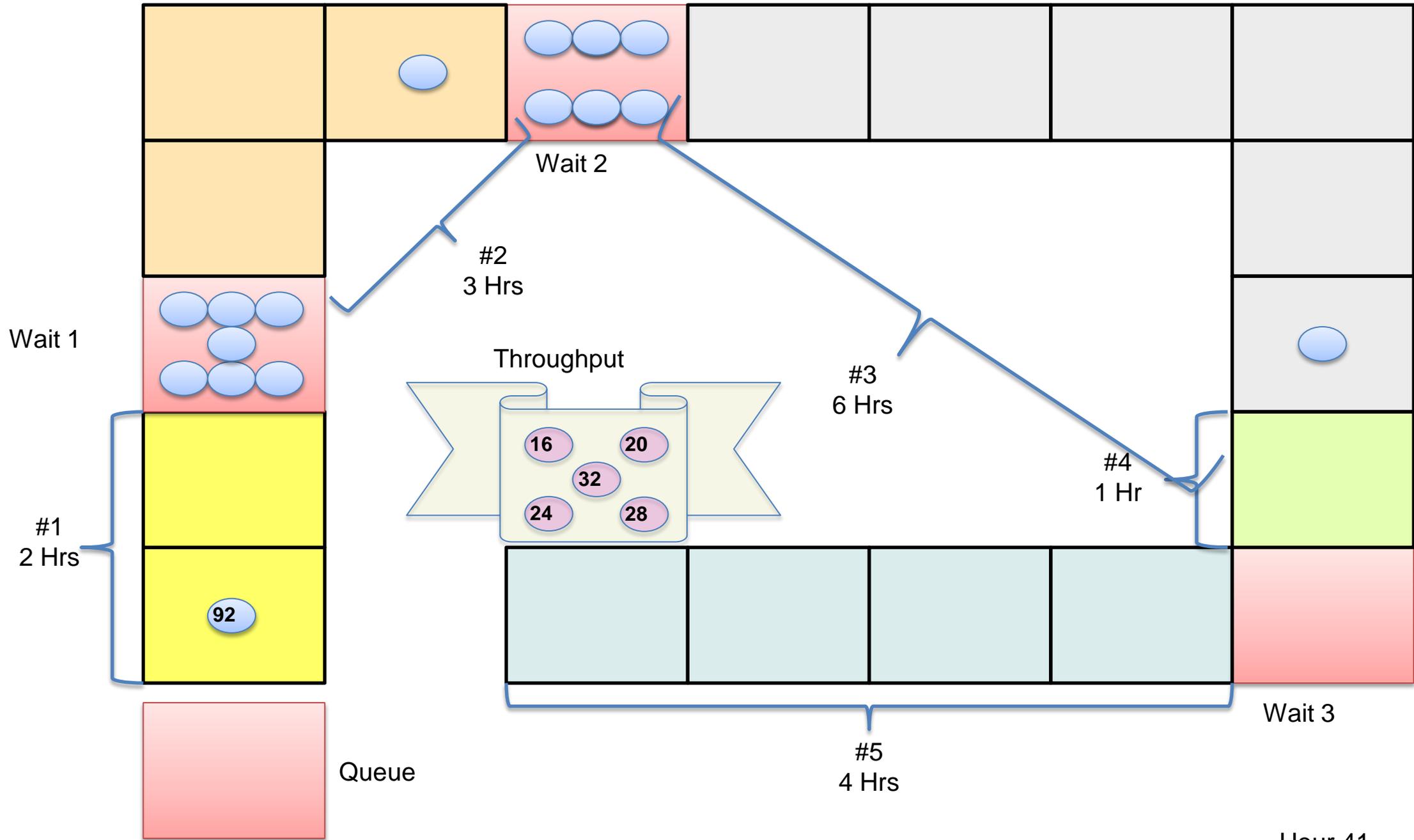
#3
6 Hrs

#4
1 Hr

#5
4 Hrs

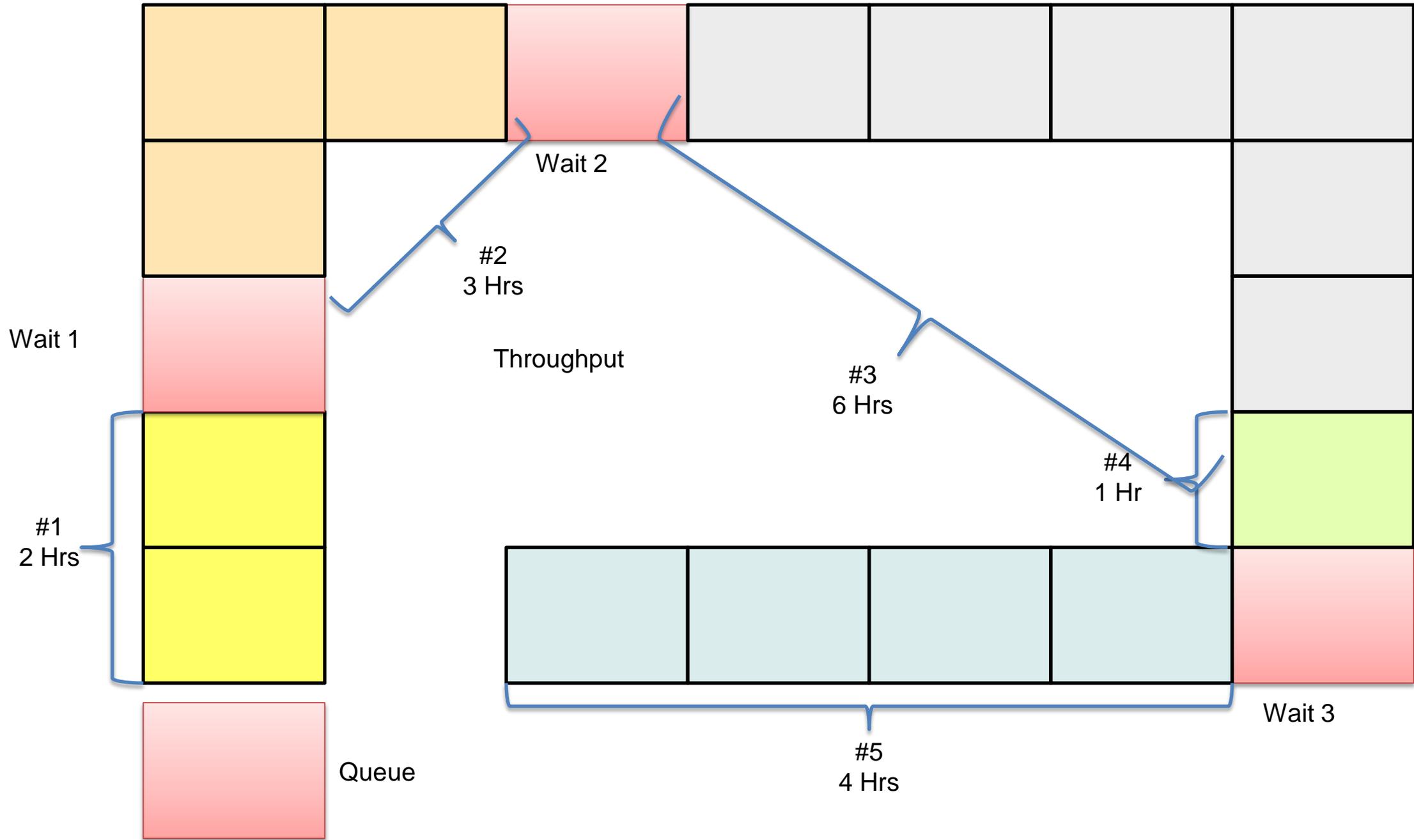
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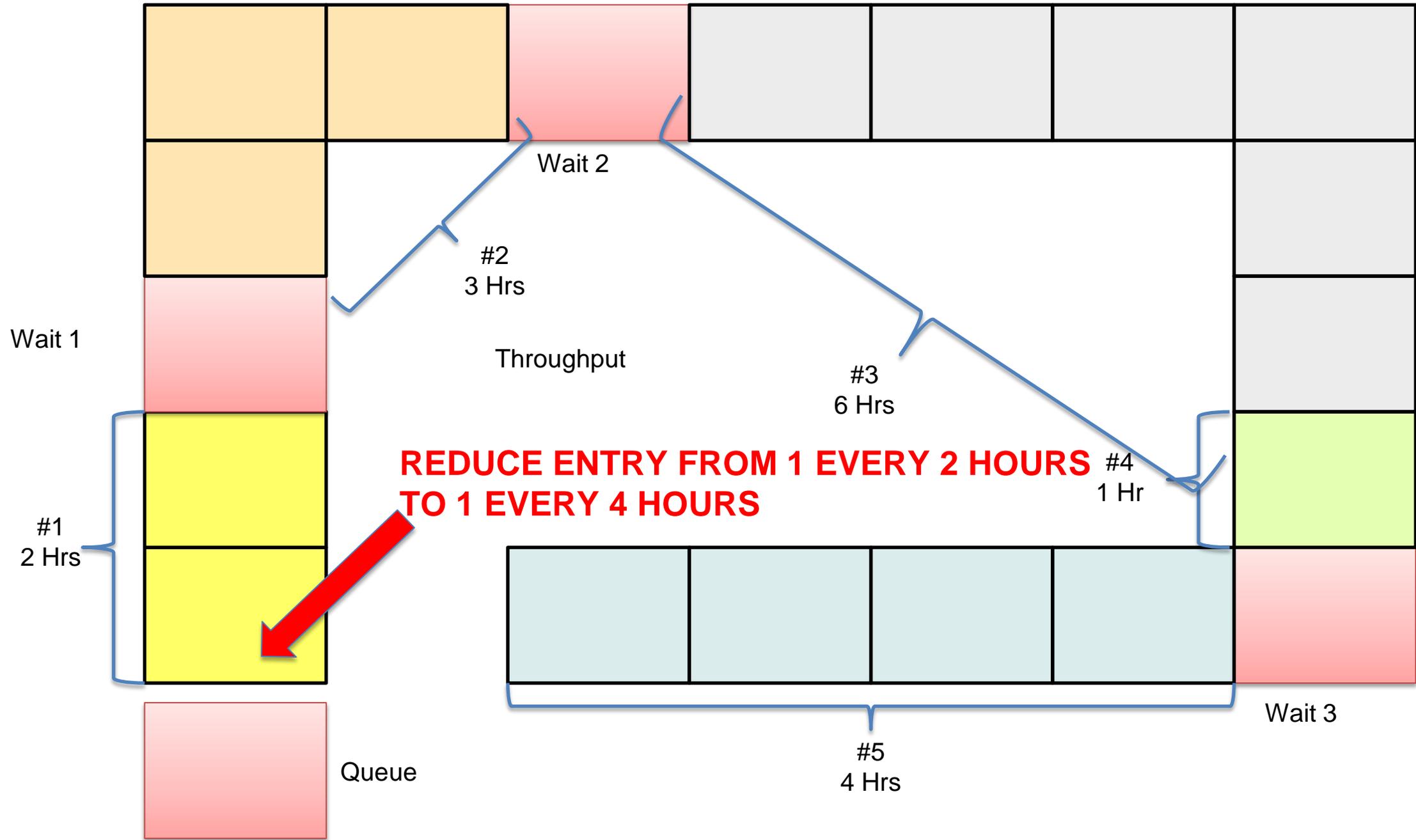
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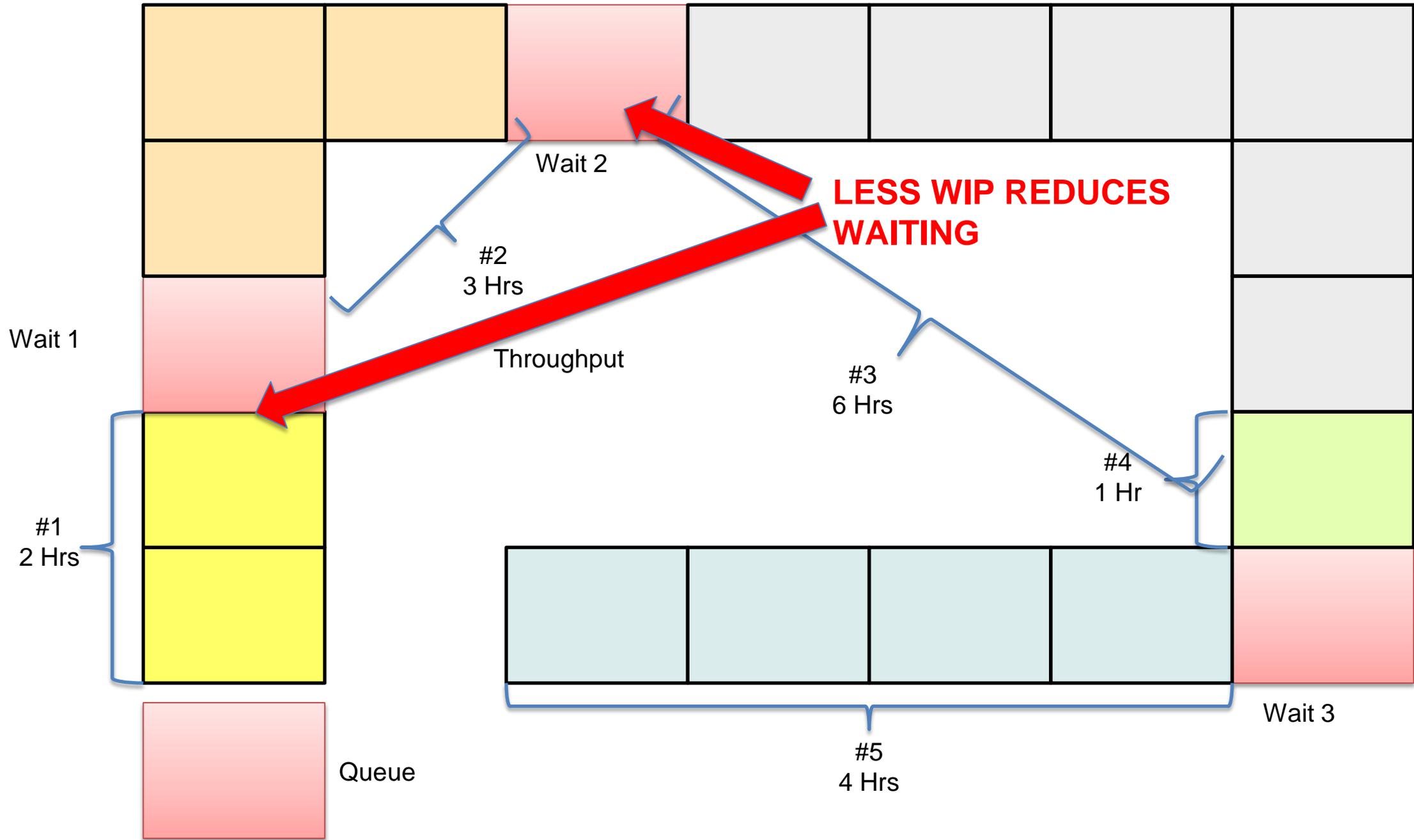


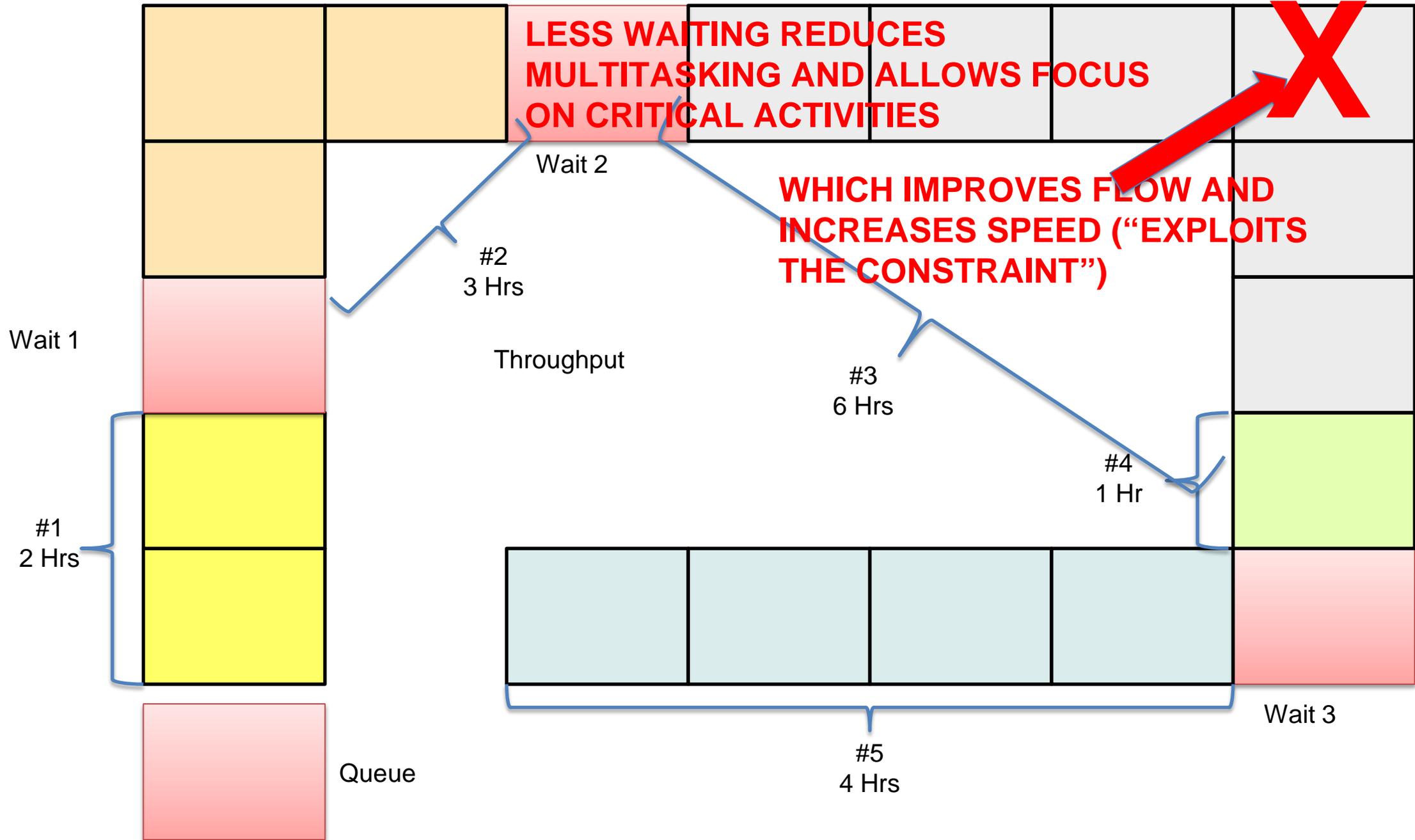
To improve flow

- Reduce WIP (usually by half or more)
 - Less WIP enables:
 - Less multitasking
 - More blue-light (critical activities)
 - Excess capacity to focus on/assist critical activities such as ensuring full-kit, triage, and quality at source
 - Smarter flow of throughput
 - Faster processing
- Exploit the constraint
- Subordinate to the constraint



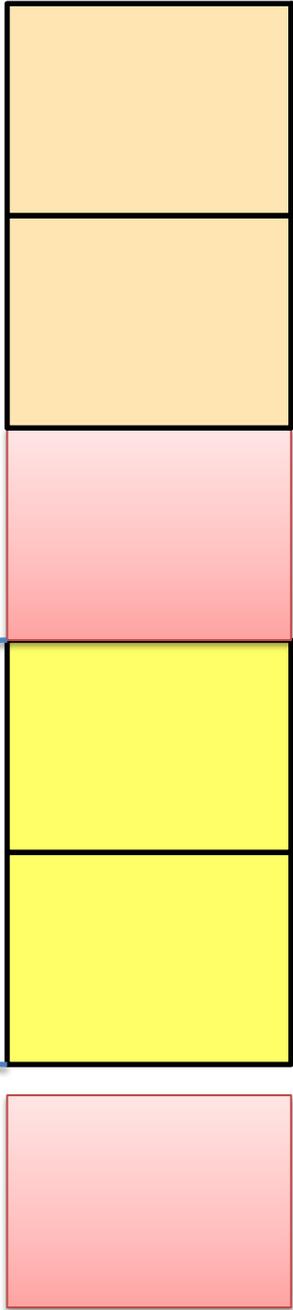






Wait 1

#1
2 Hrs



Queue

Wait 2

#2
3 Hrs

Throughput

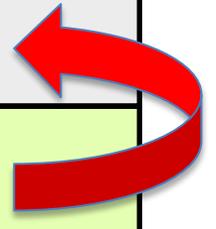
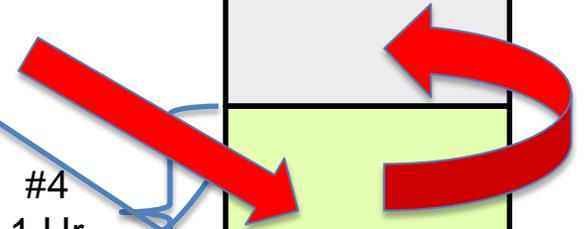
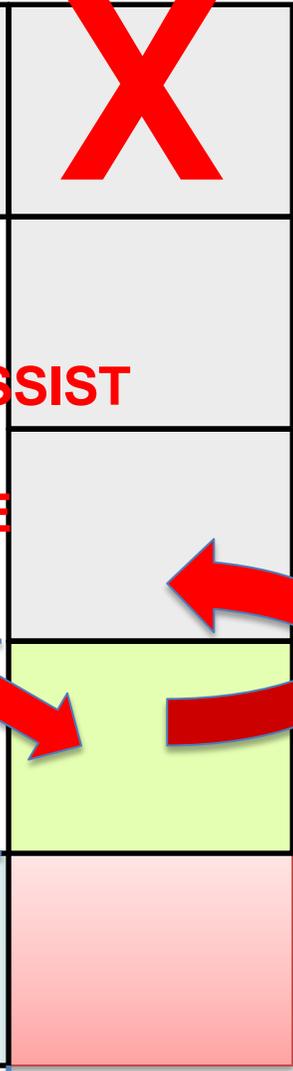
**AND SMARTER FLOW
ENABLES AREAS WITH
EXCESS CAPACITY TO ASSIST
THE CONSTRAINT
("SUBORDINATES TO THE
CONSTRAINT")**

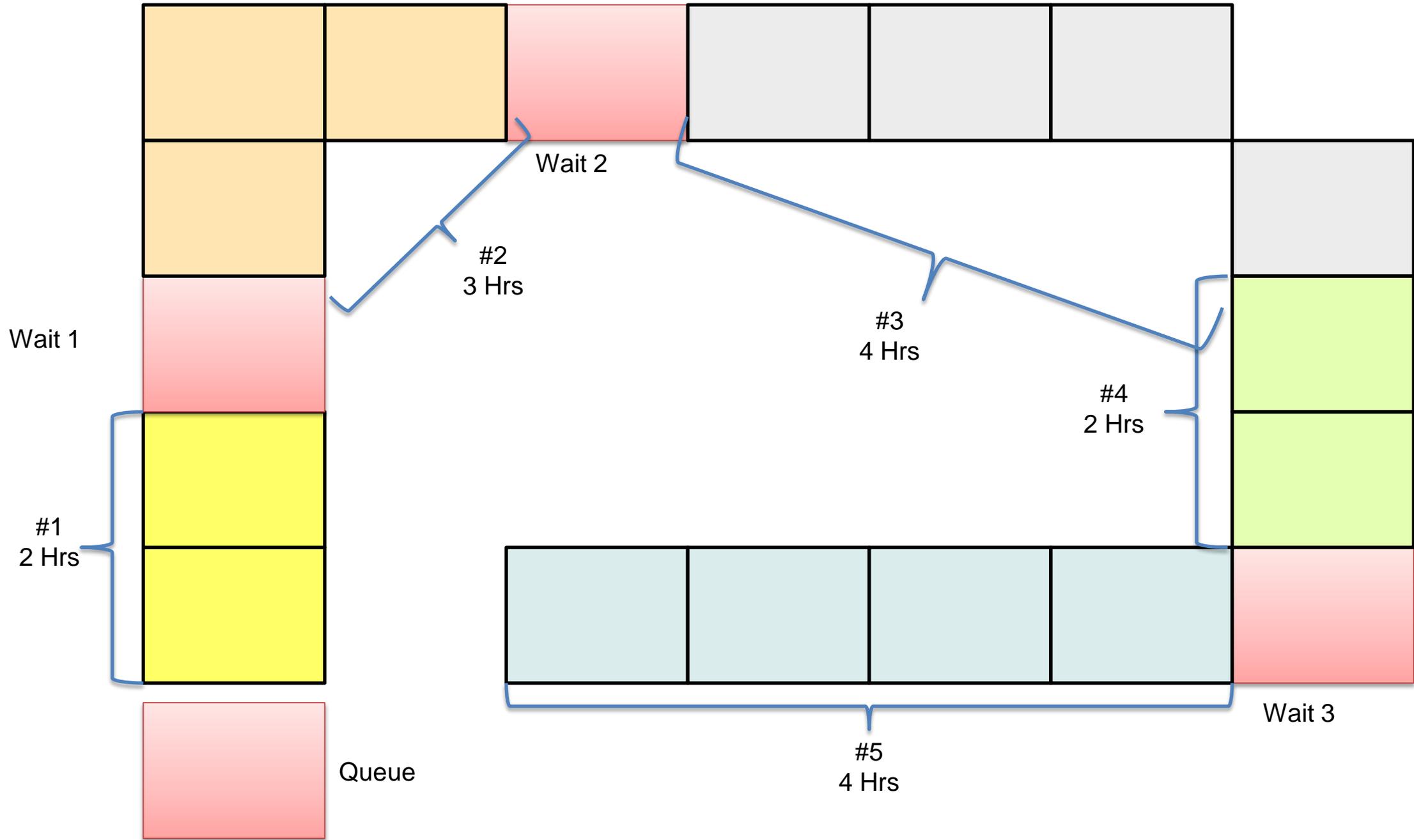
#3
6 Hrs

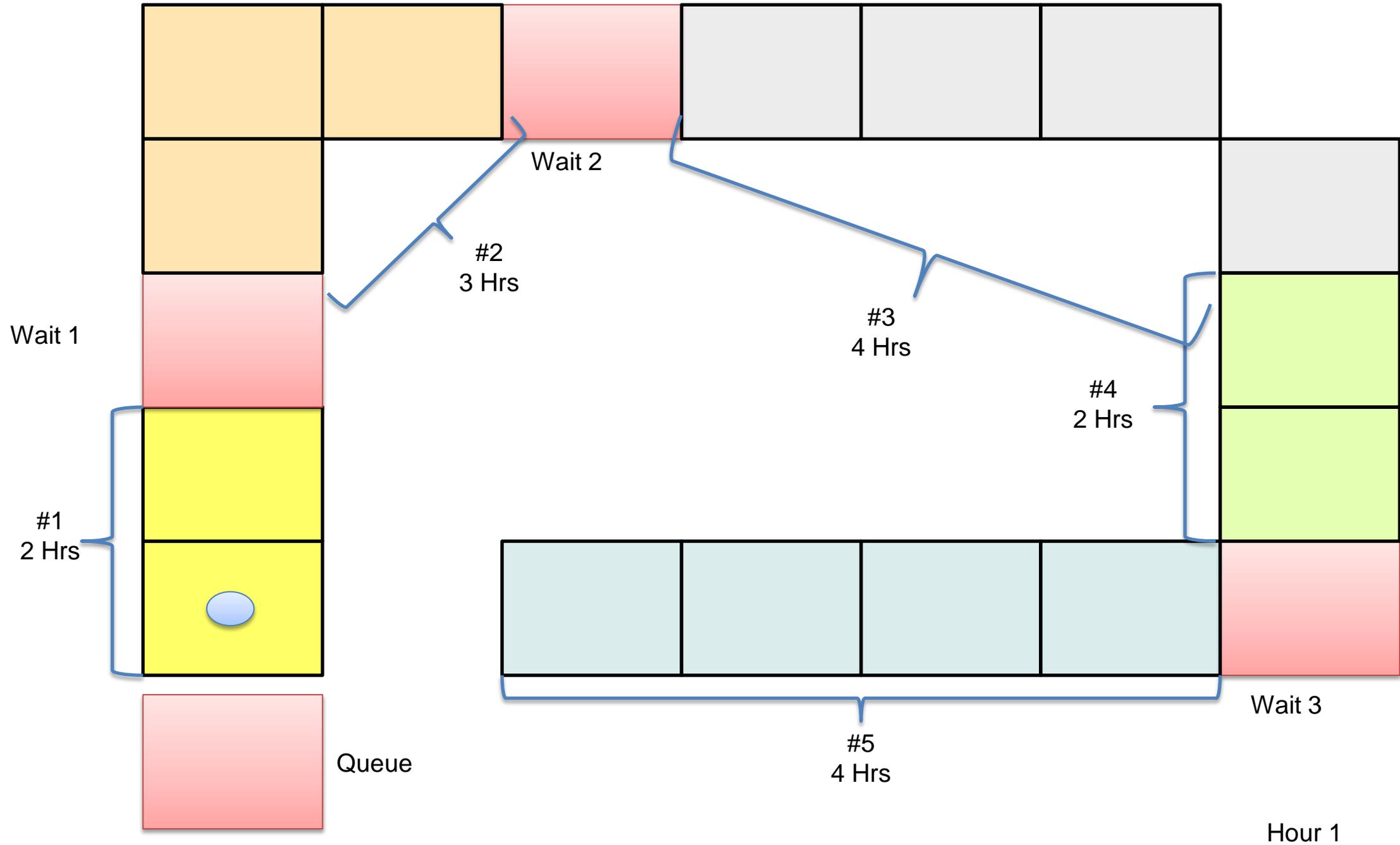
#4
1 Hr

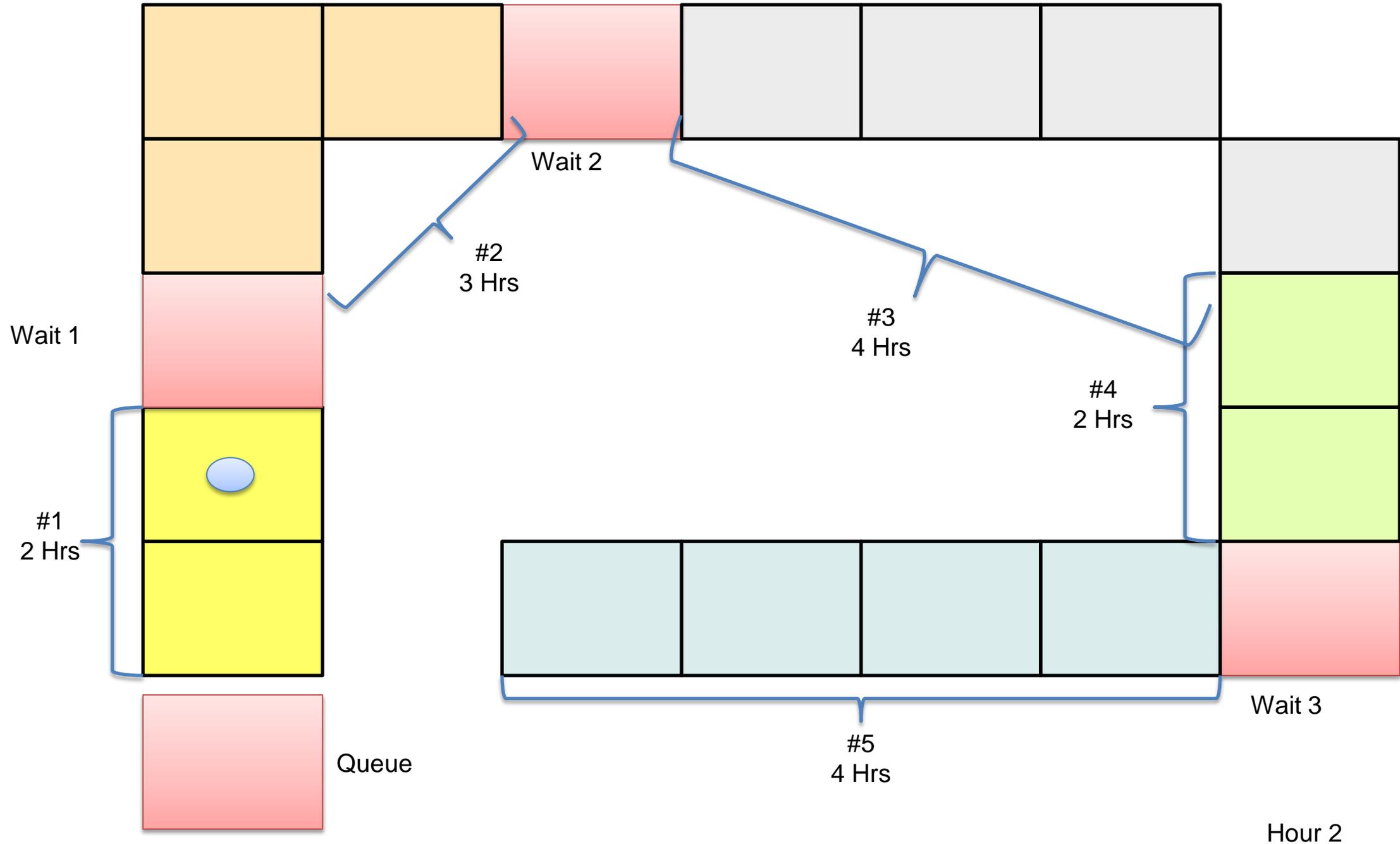
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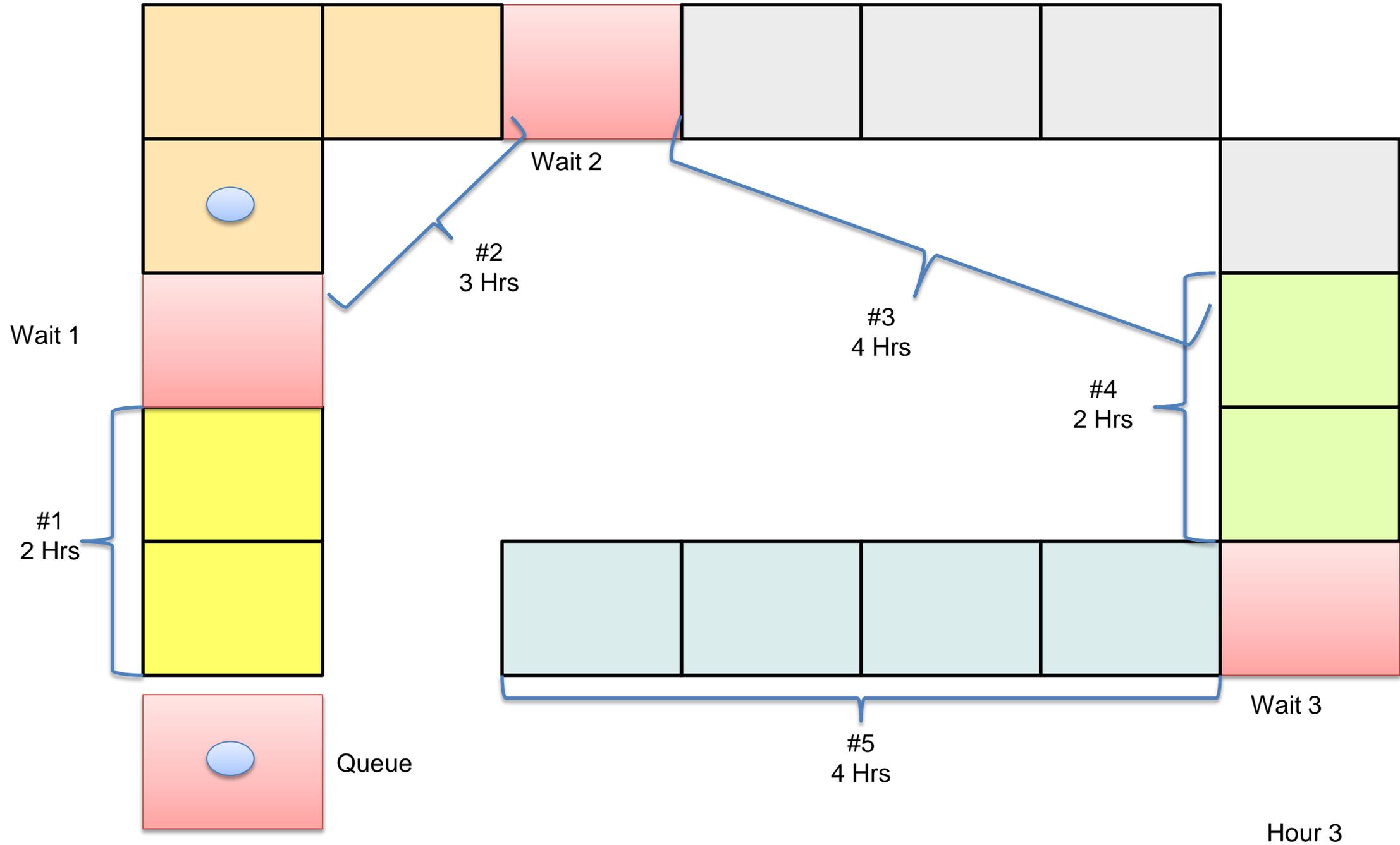
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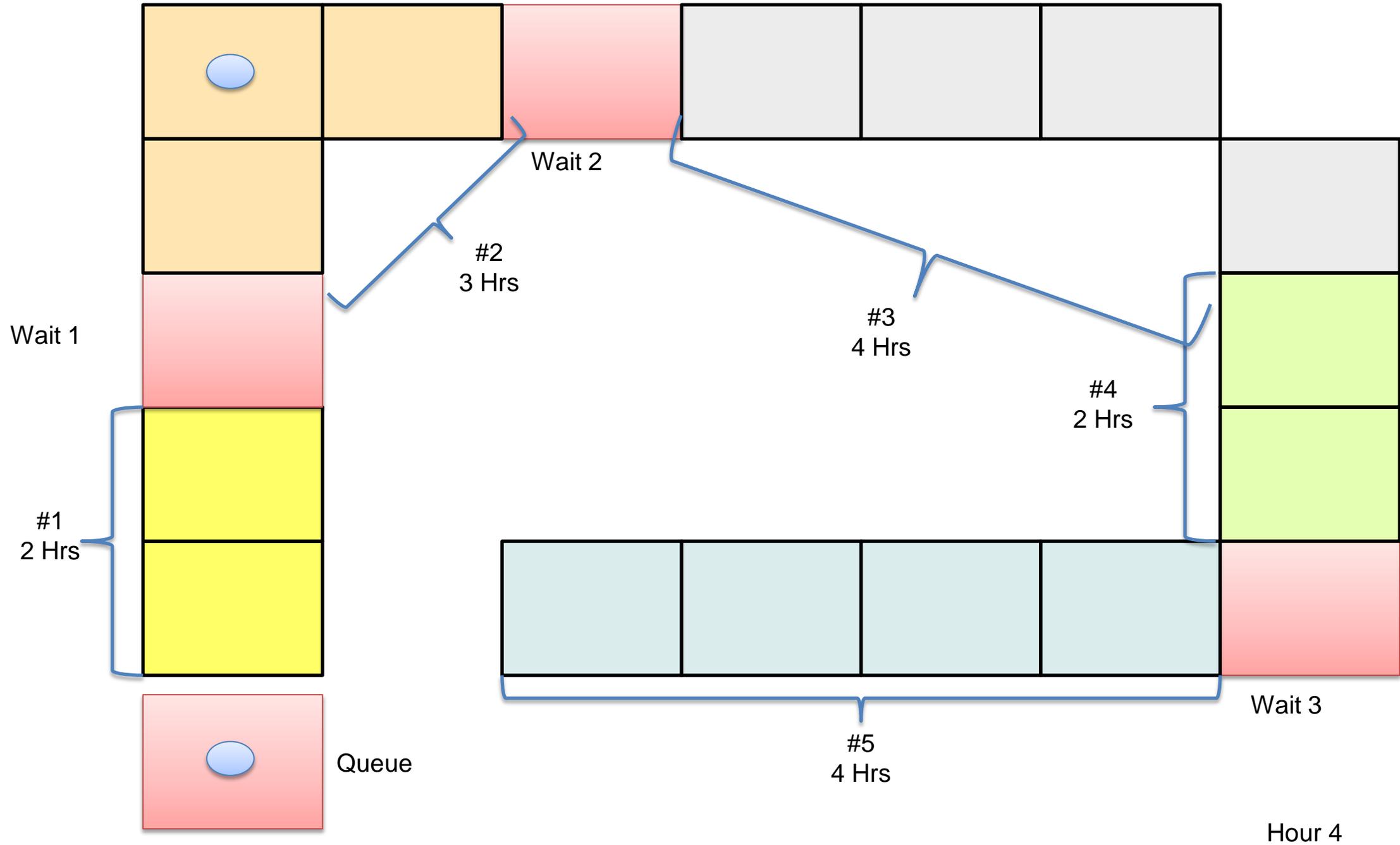


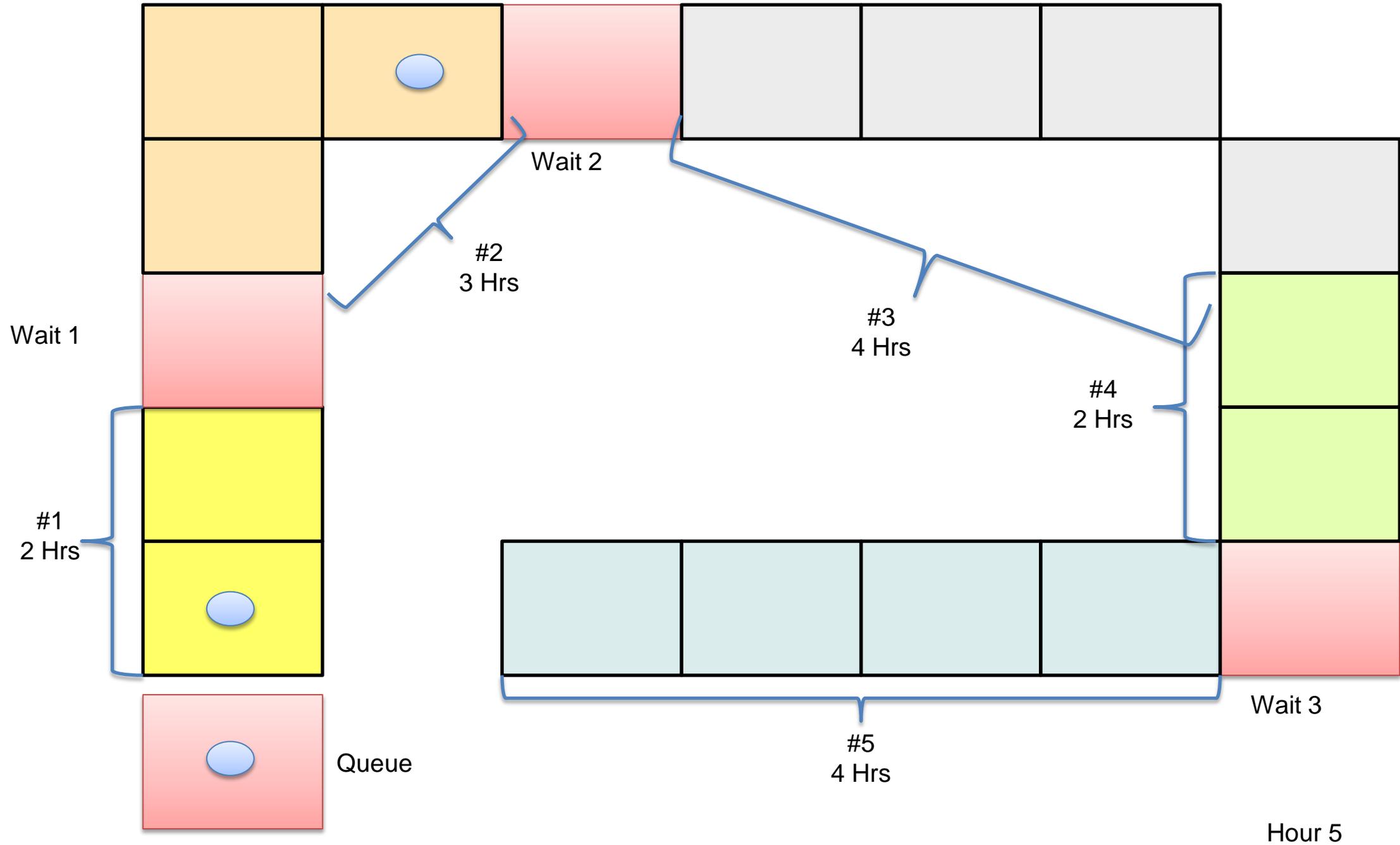


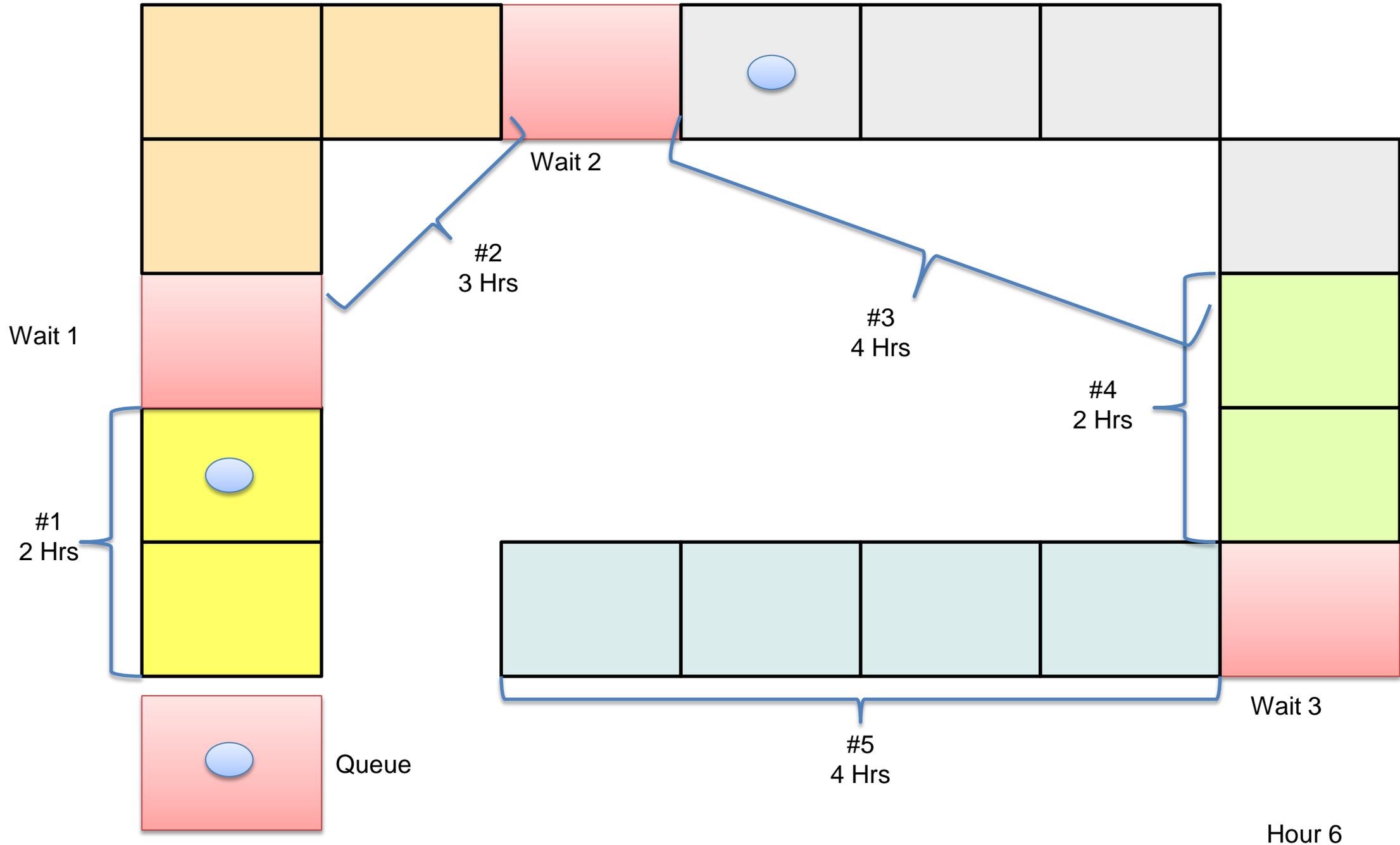


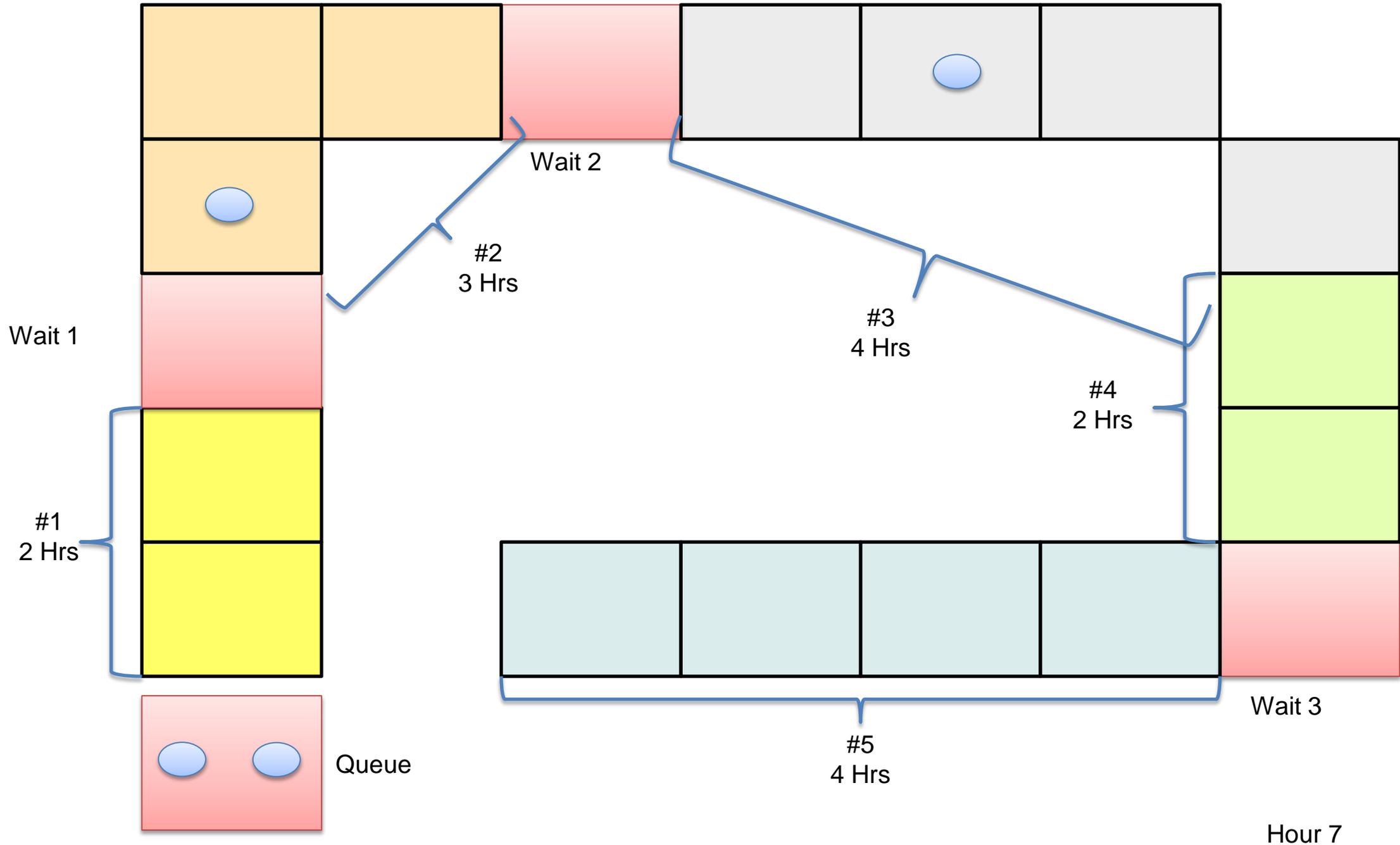


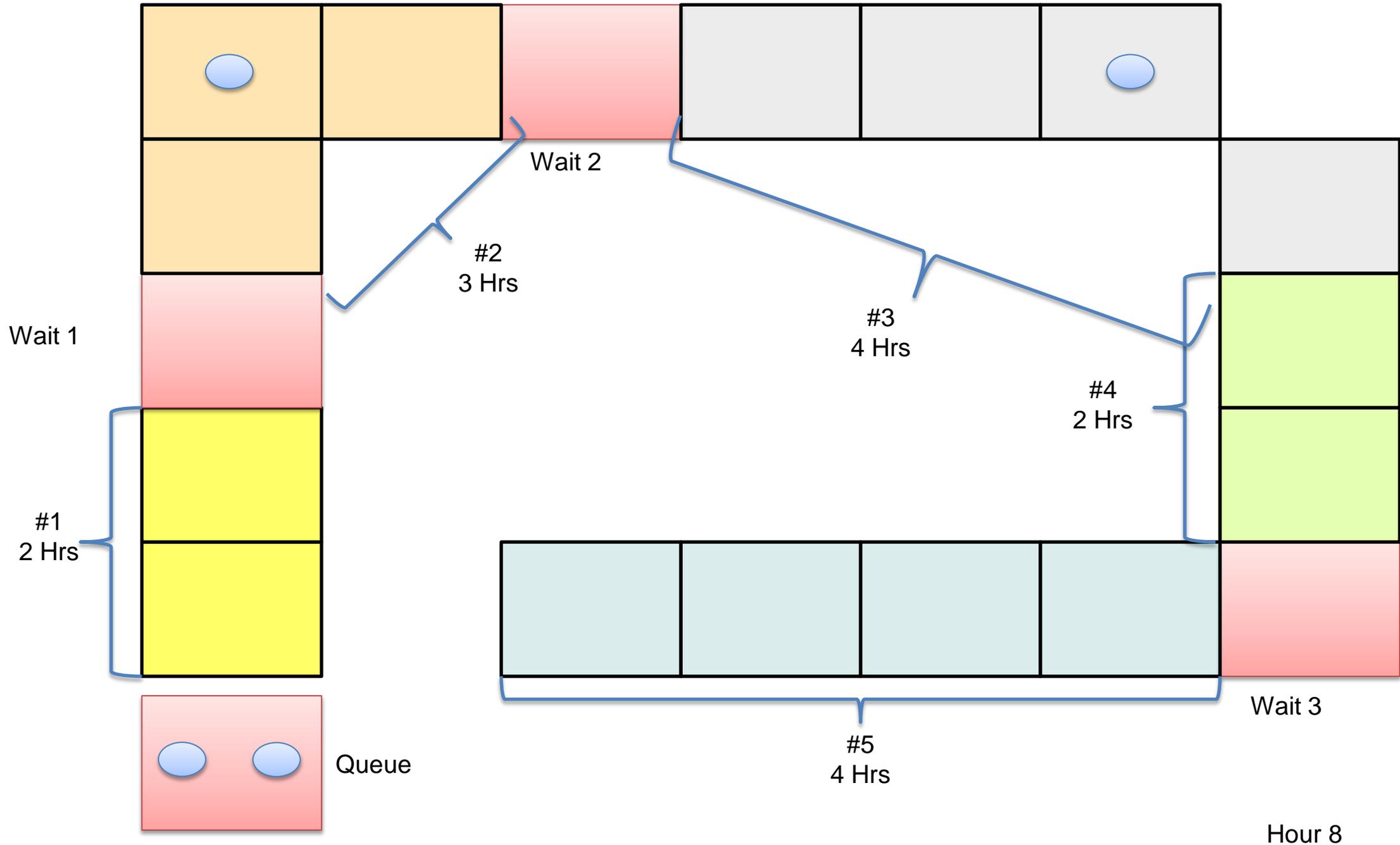


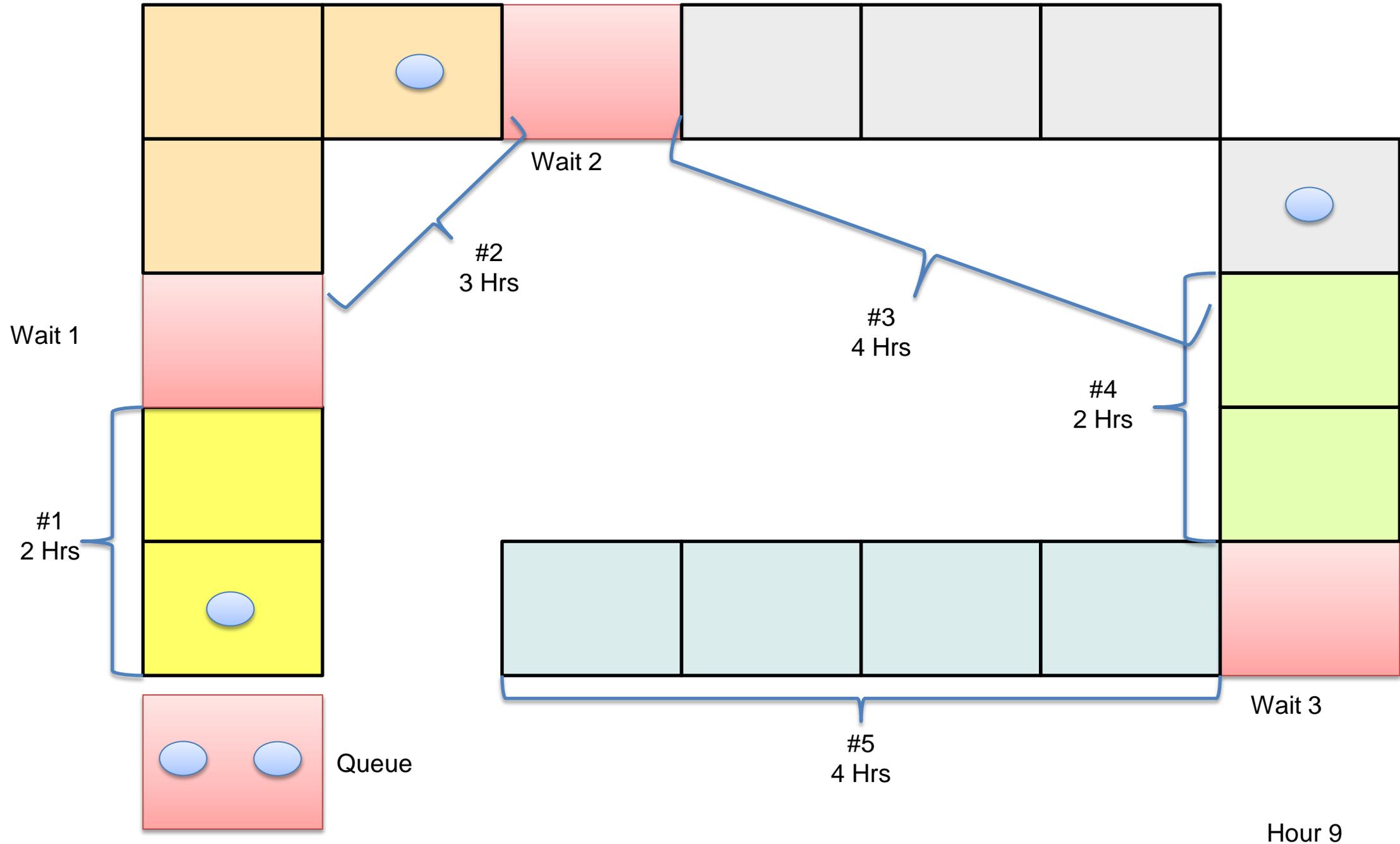


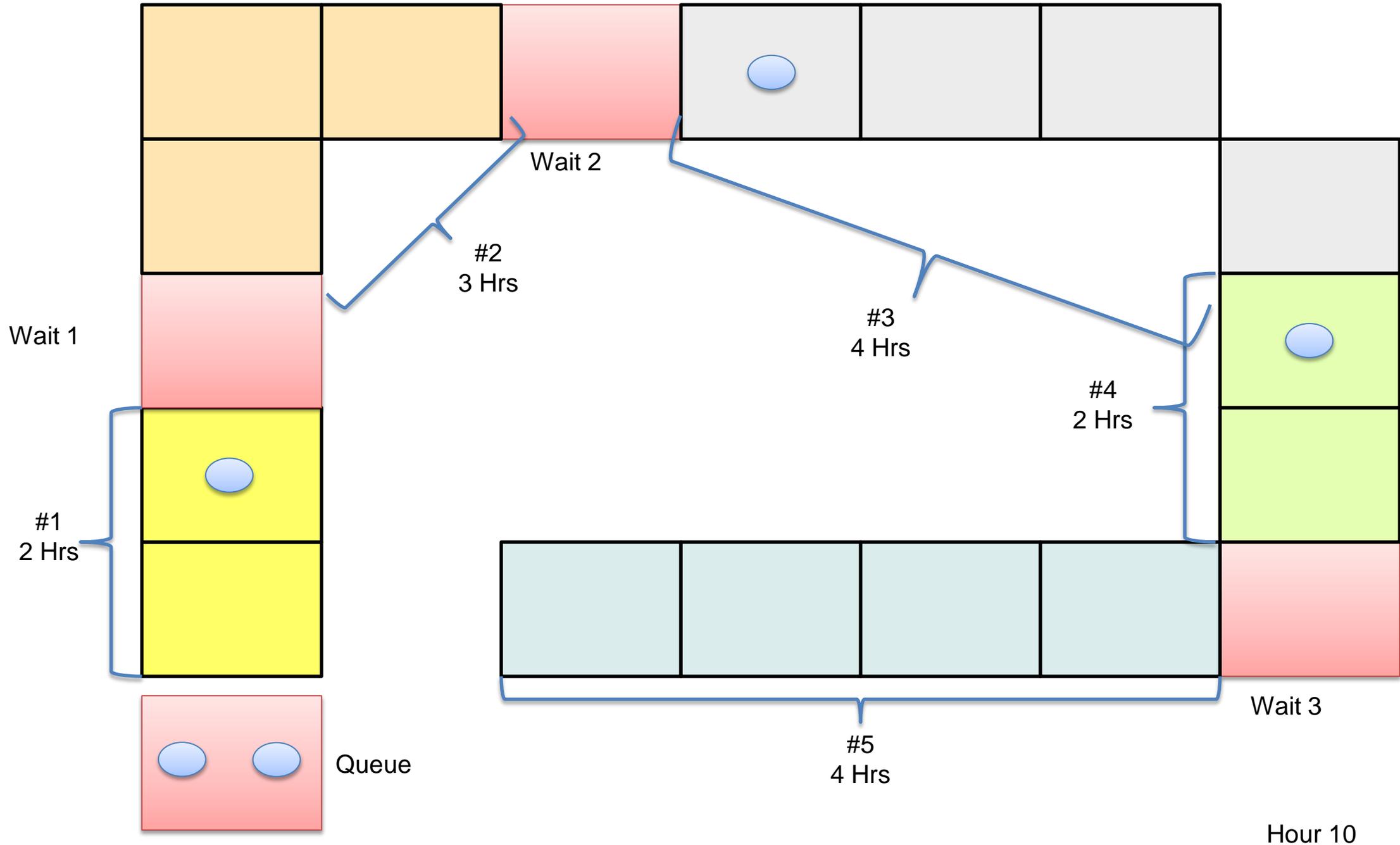


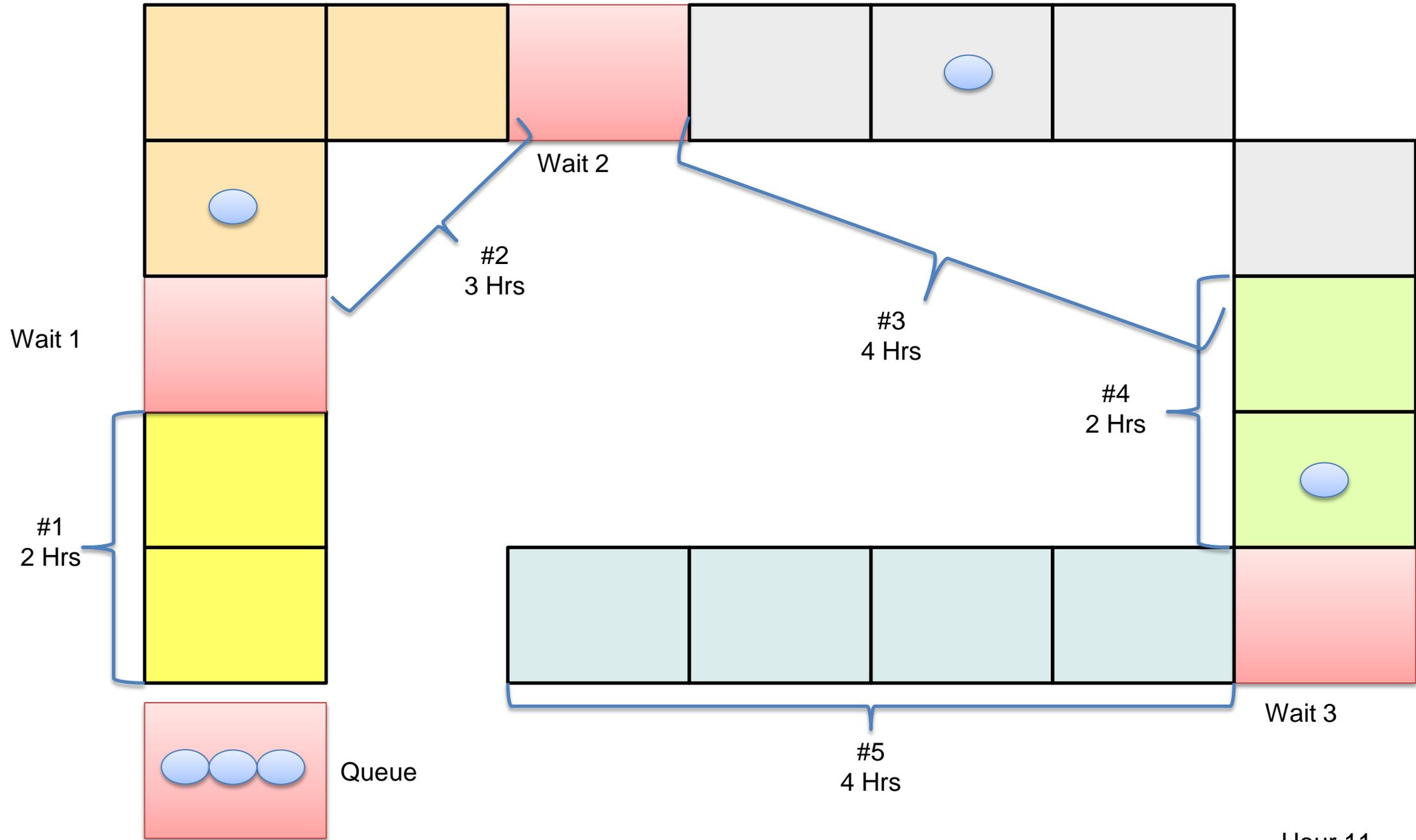


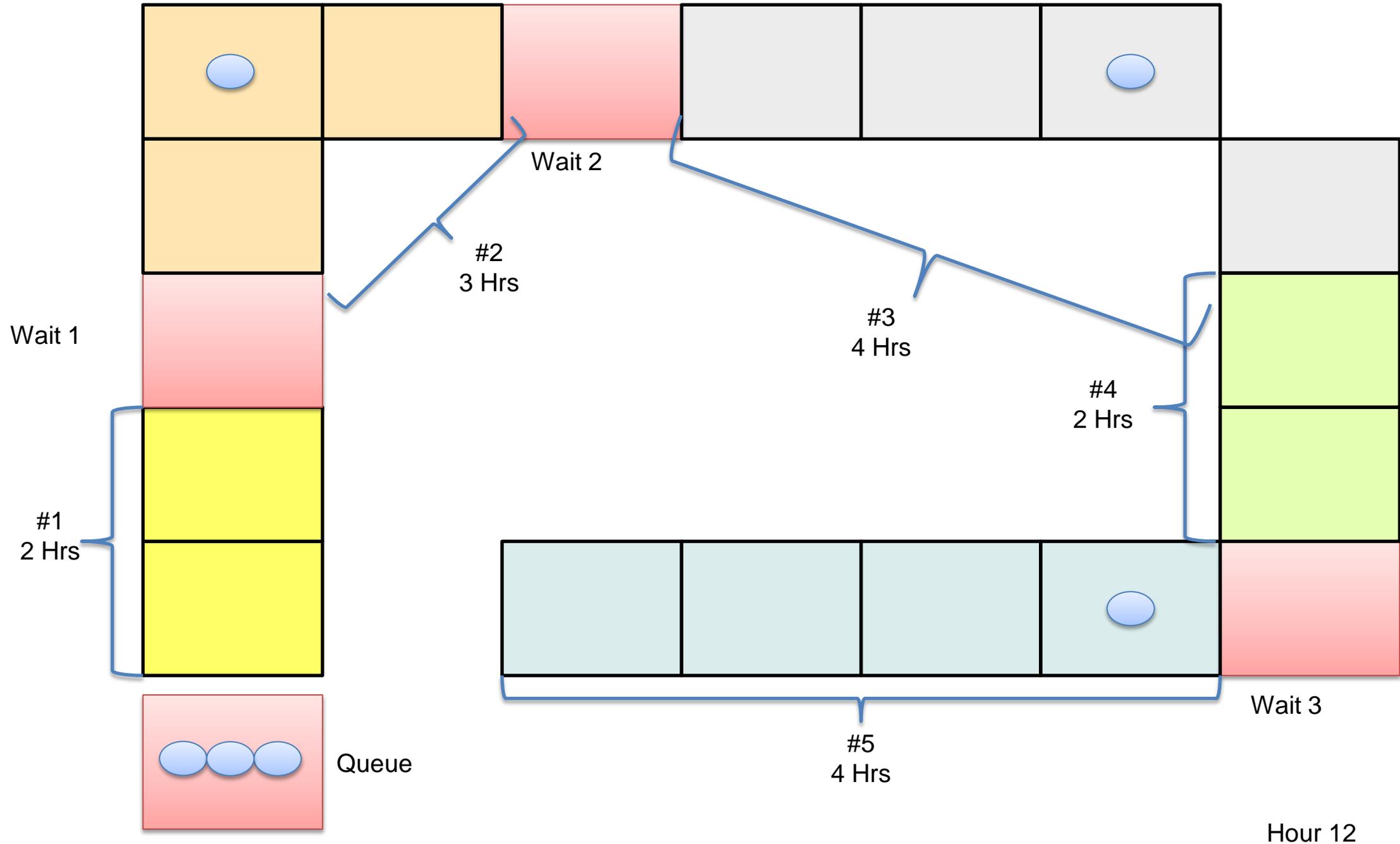


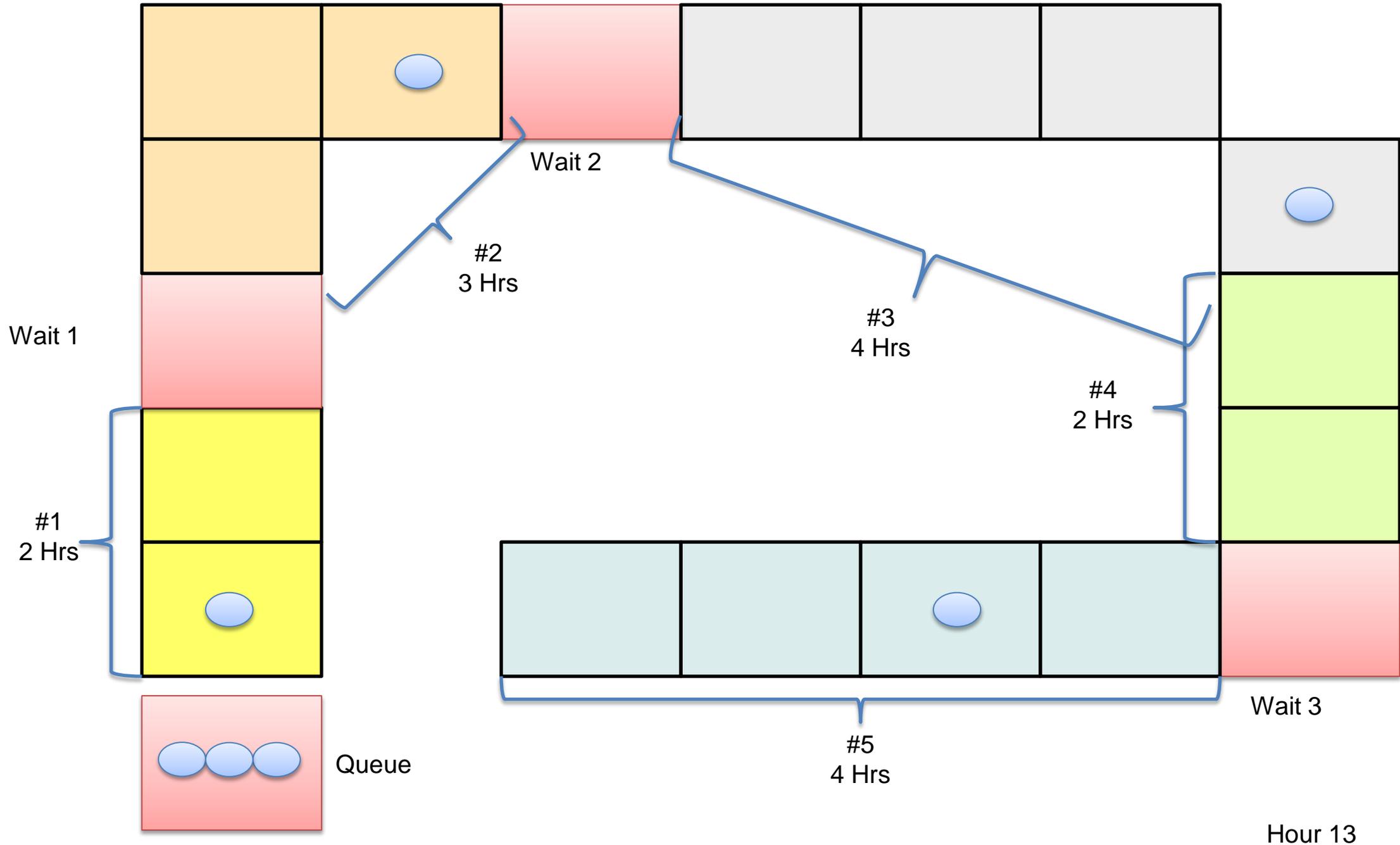


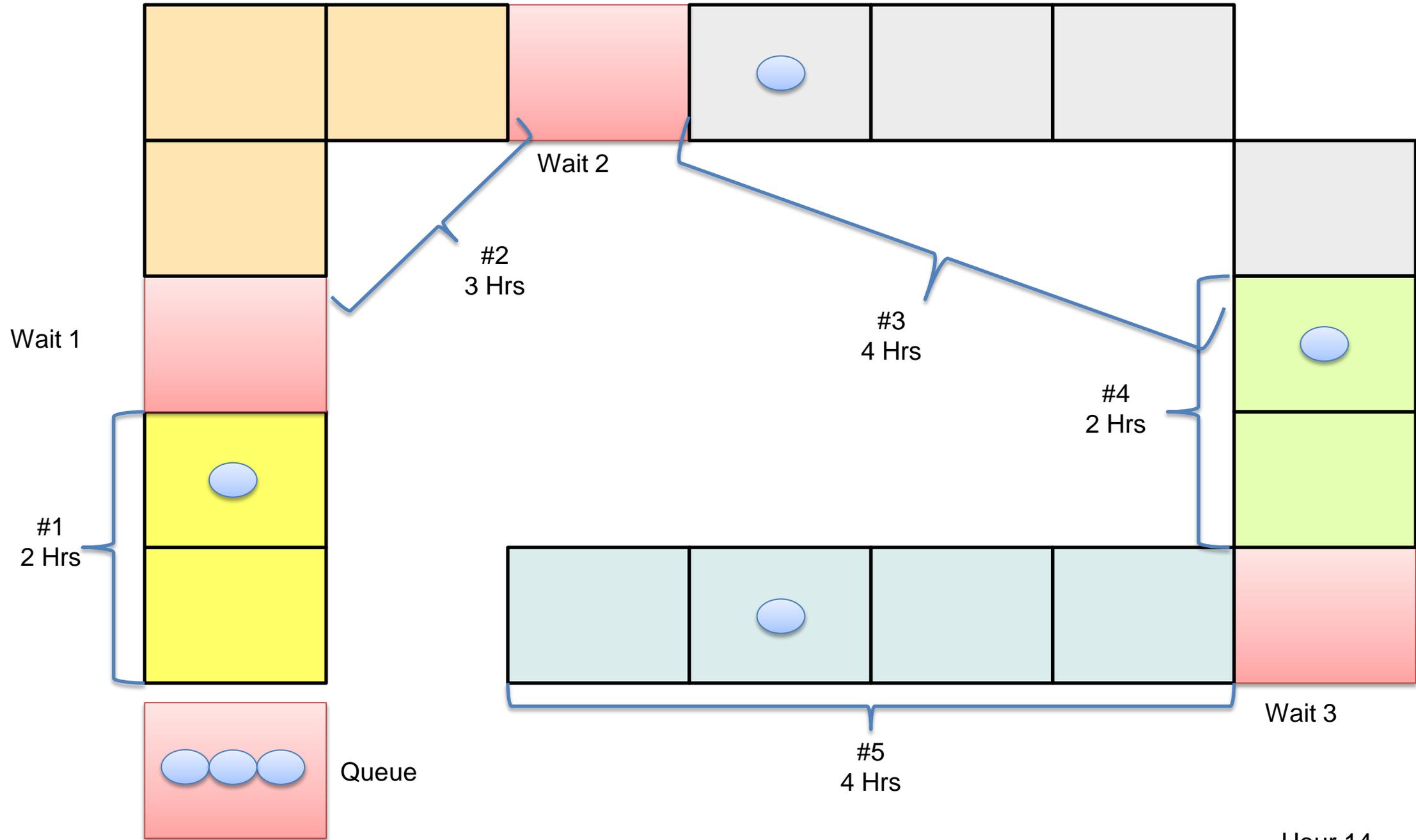




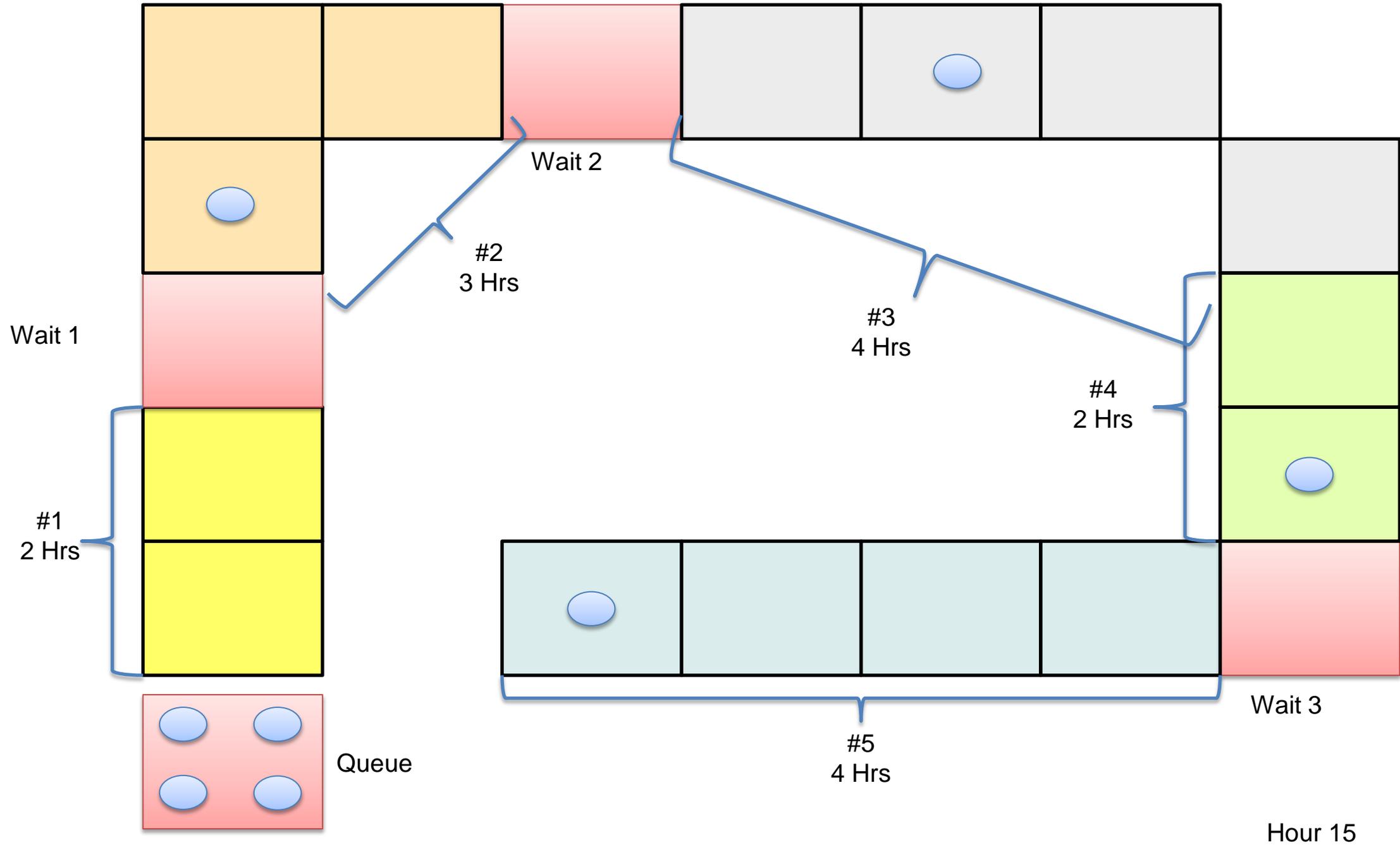


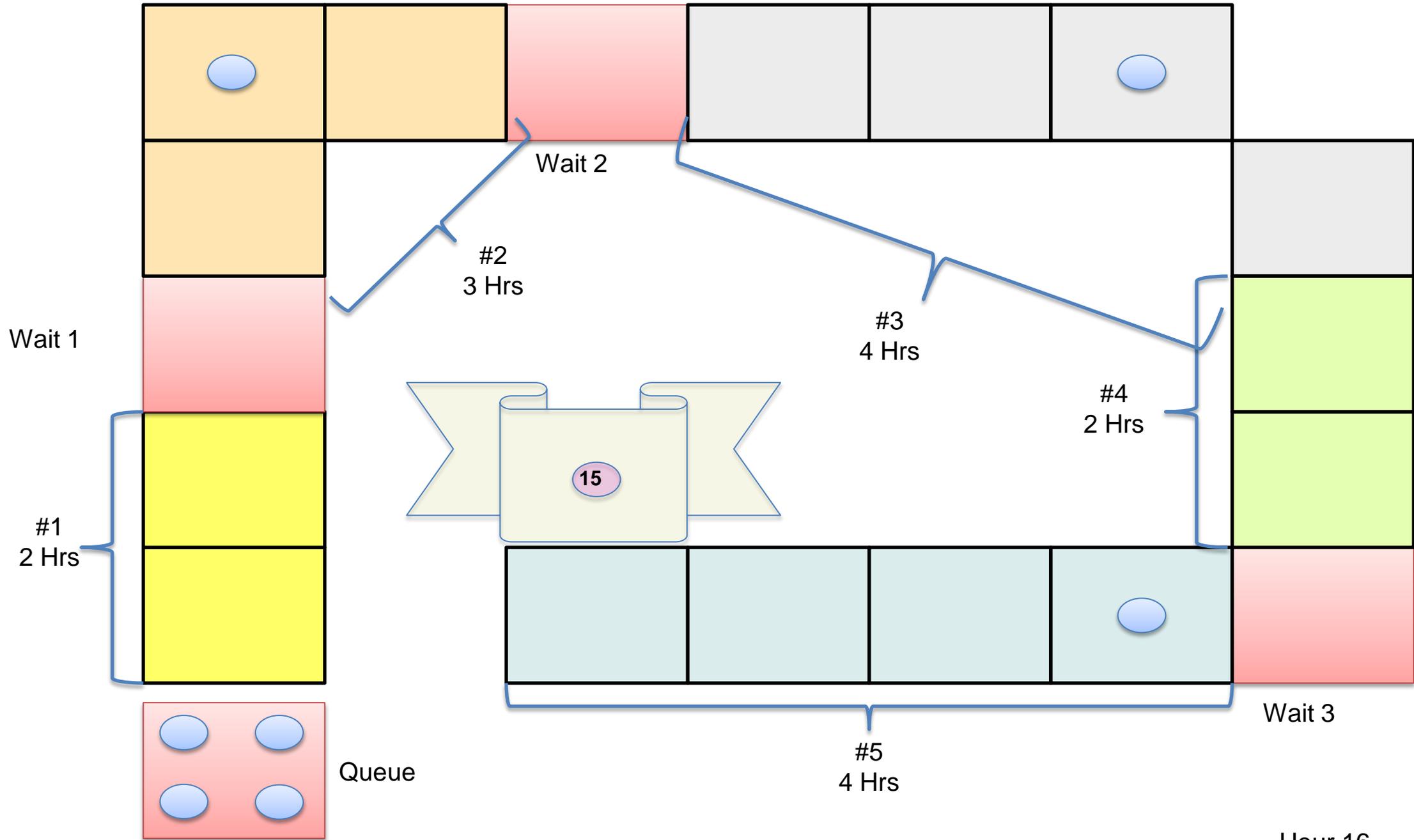


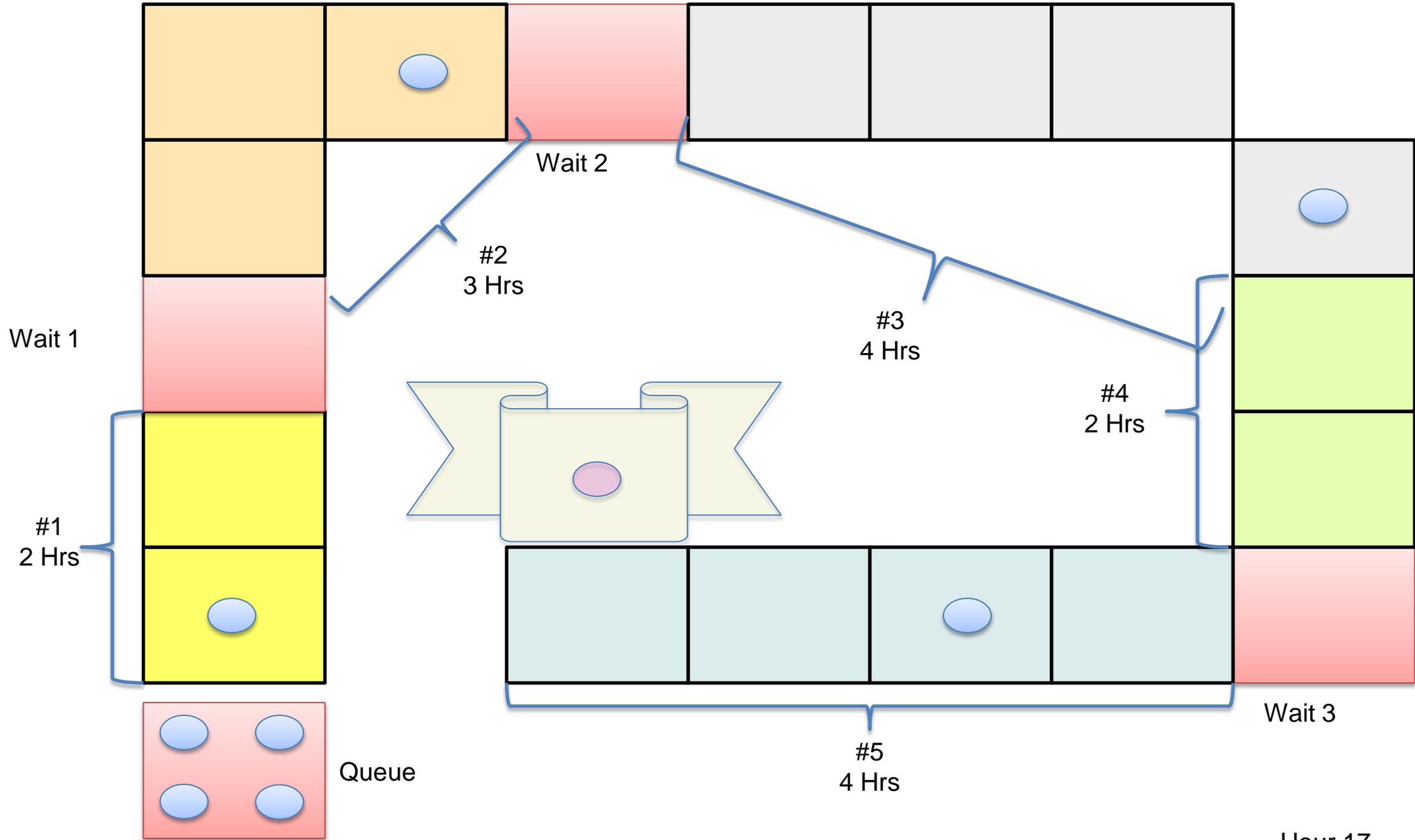


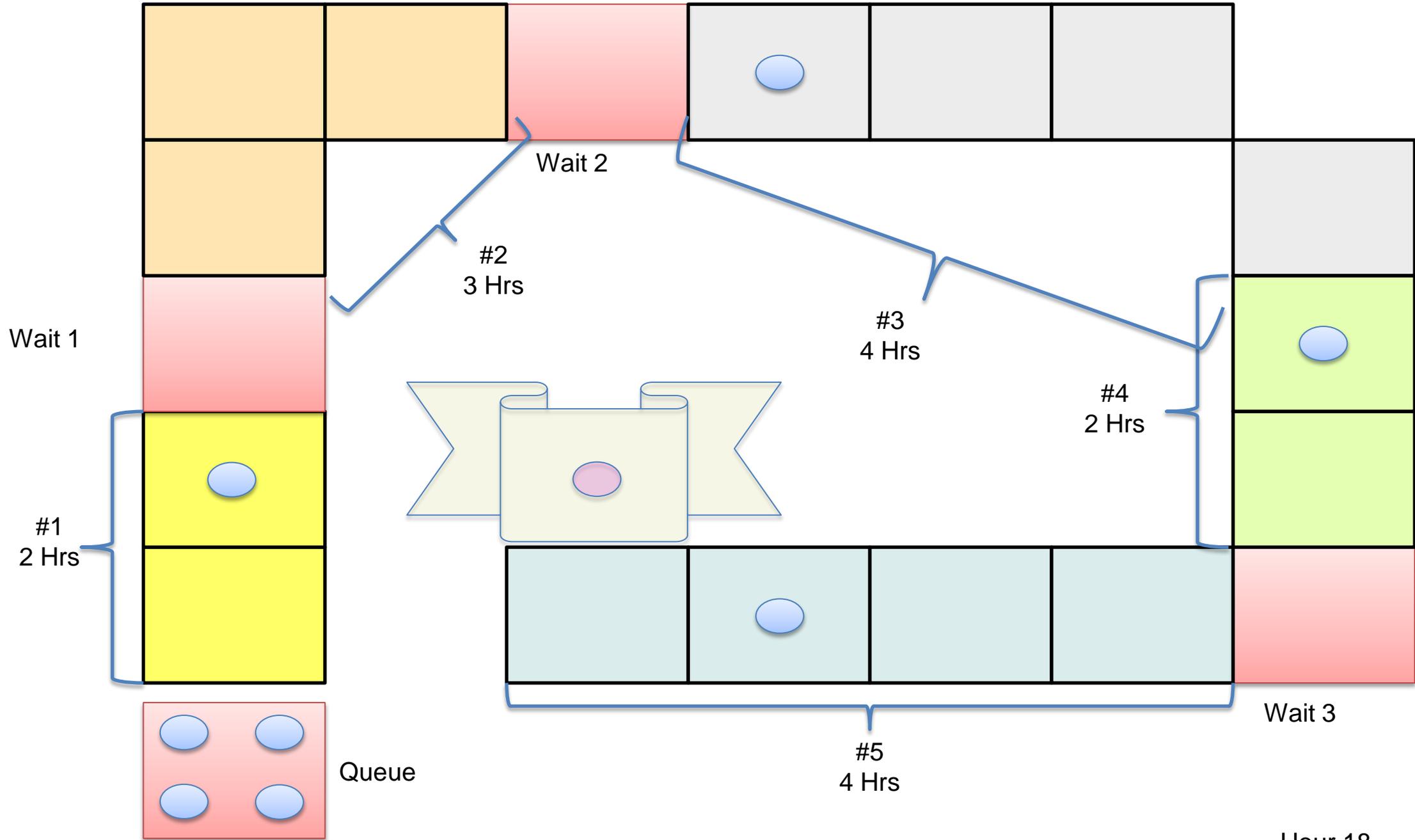


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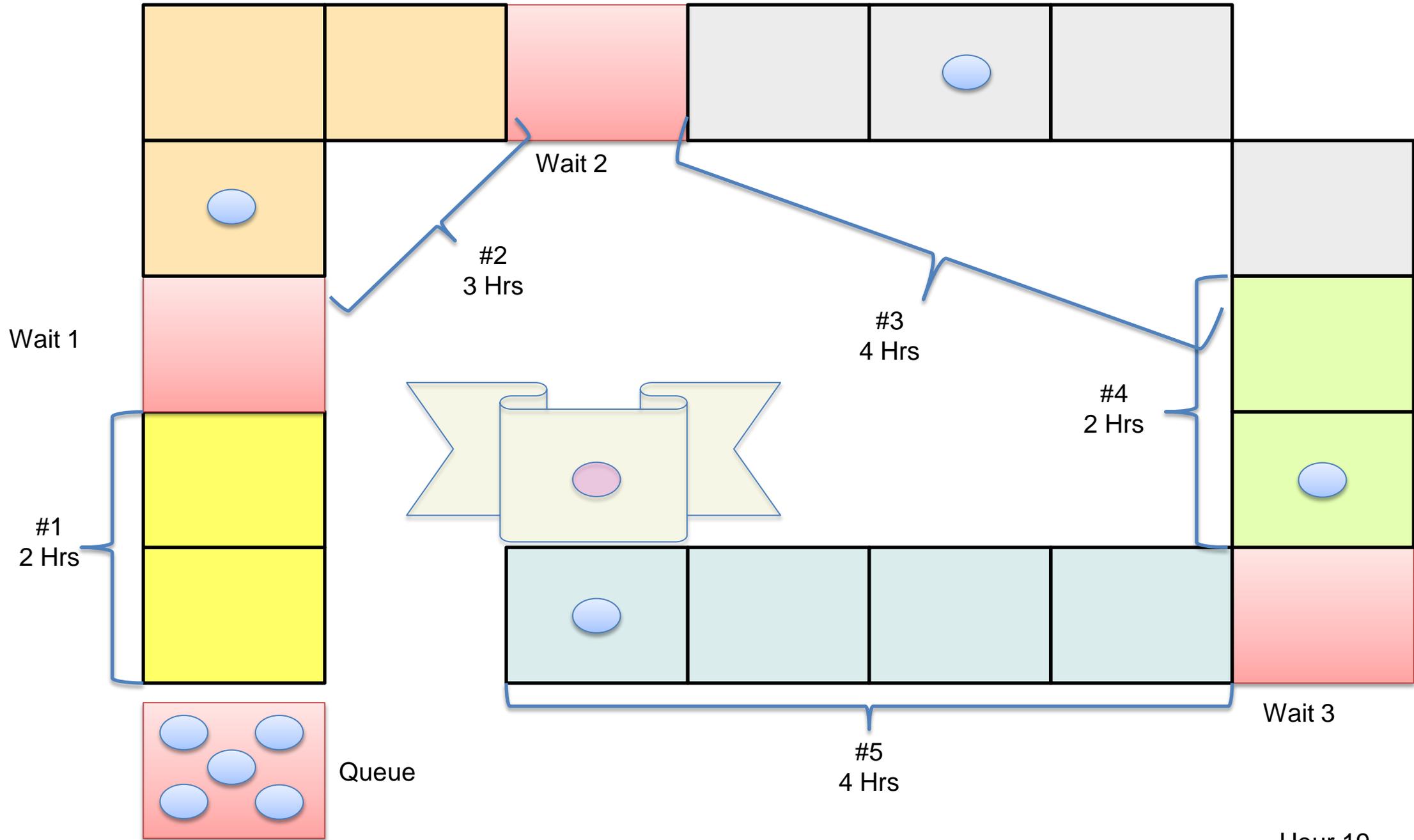




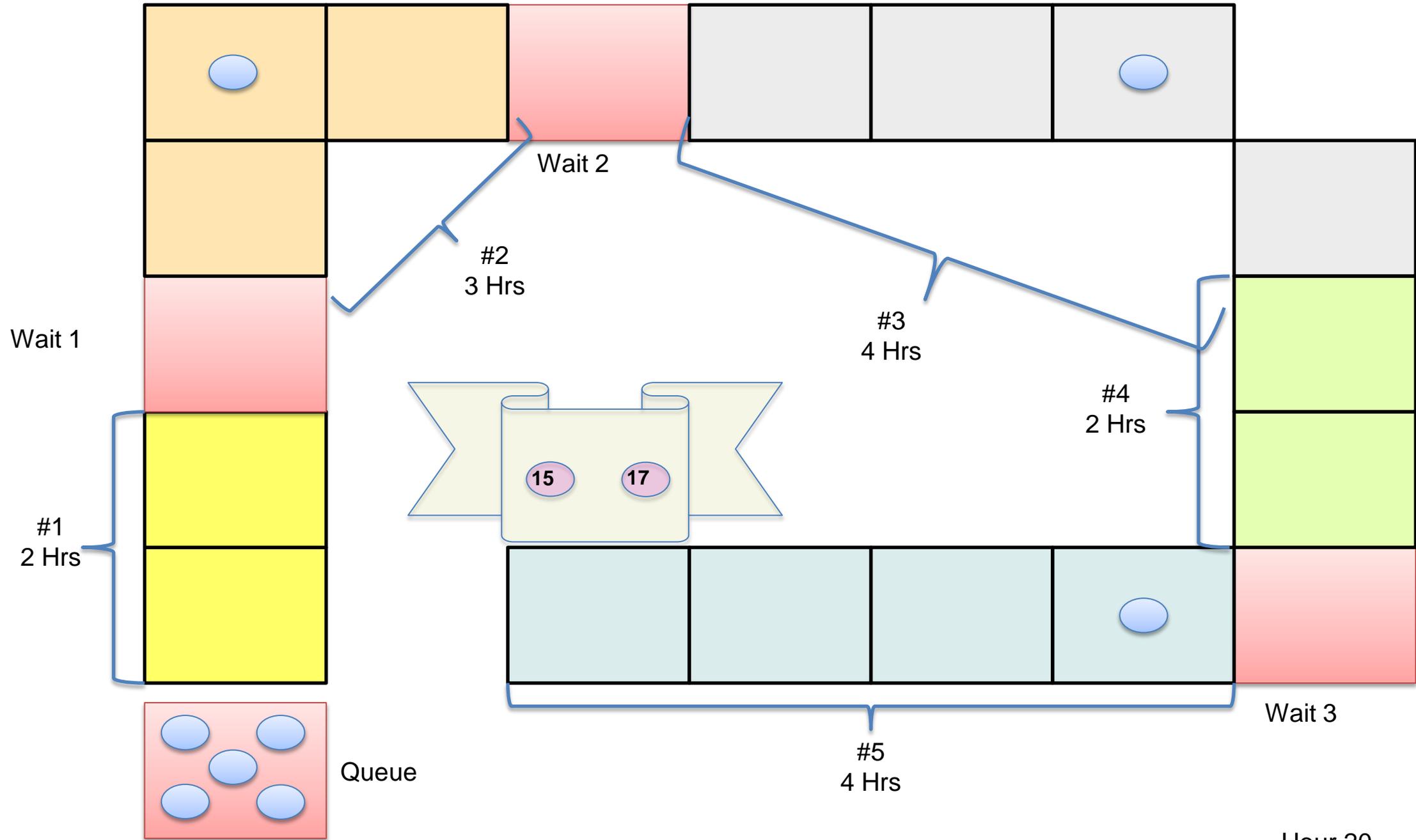




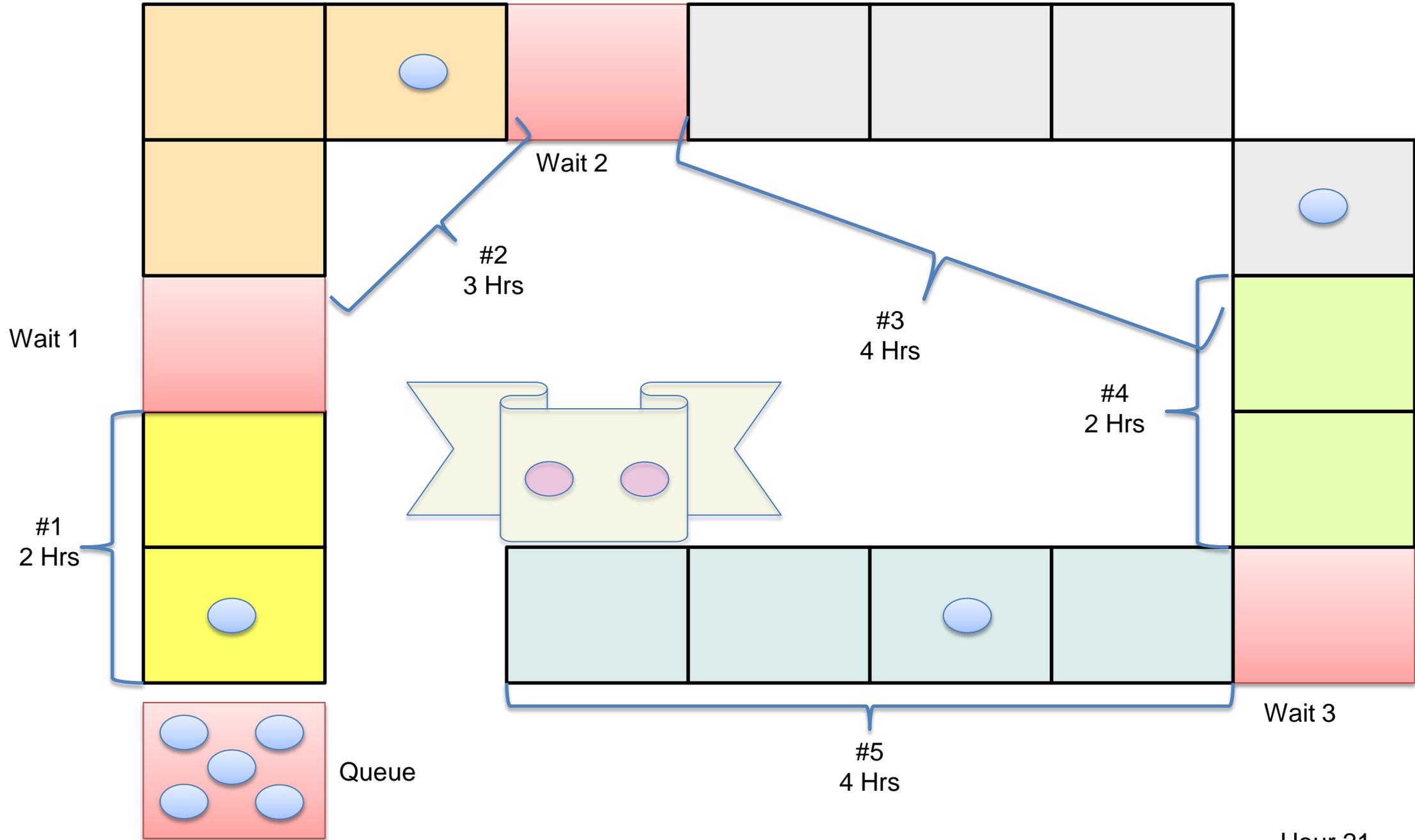
Hour 18



Hour 19

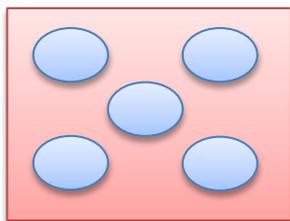
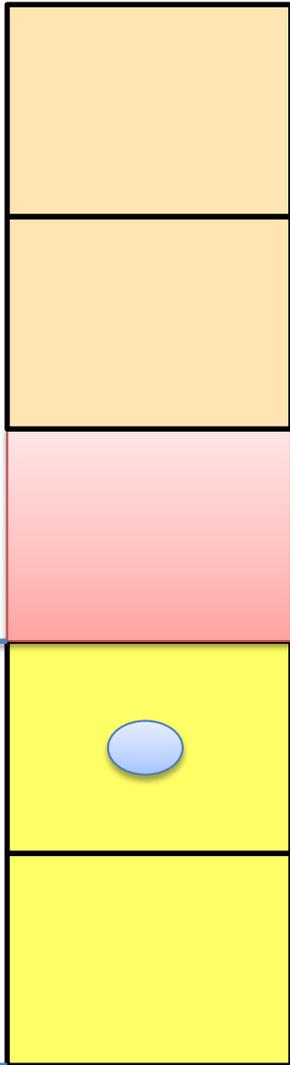


Hour 20

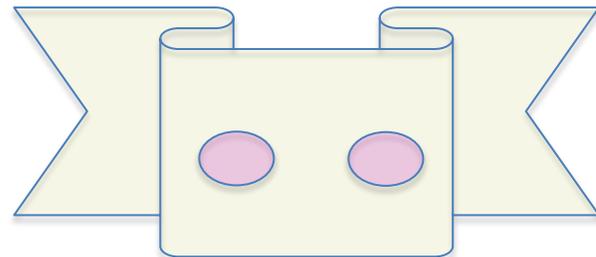


Wait 1

#1
2 Hrs



Queue



#2
3 Hrs

Wait 2

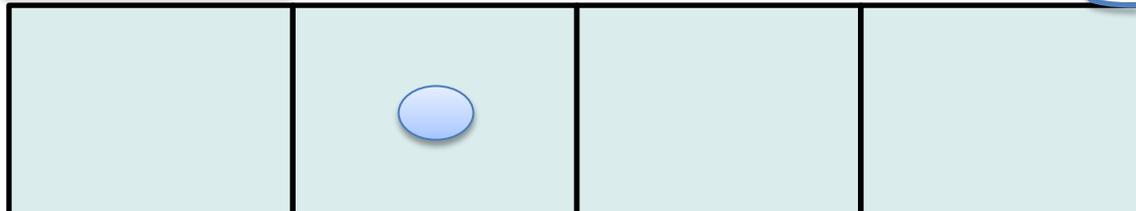
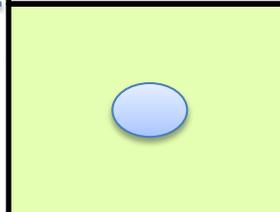
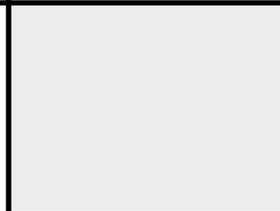
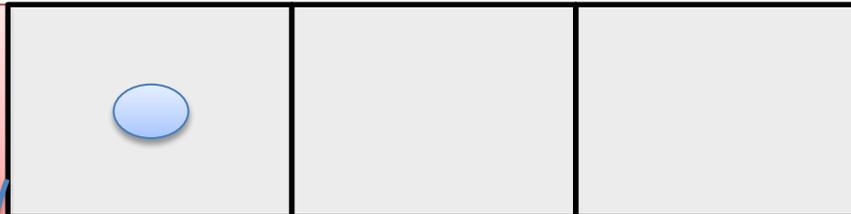
#3
4 Hrs

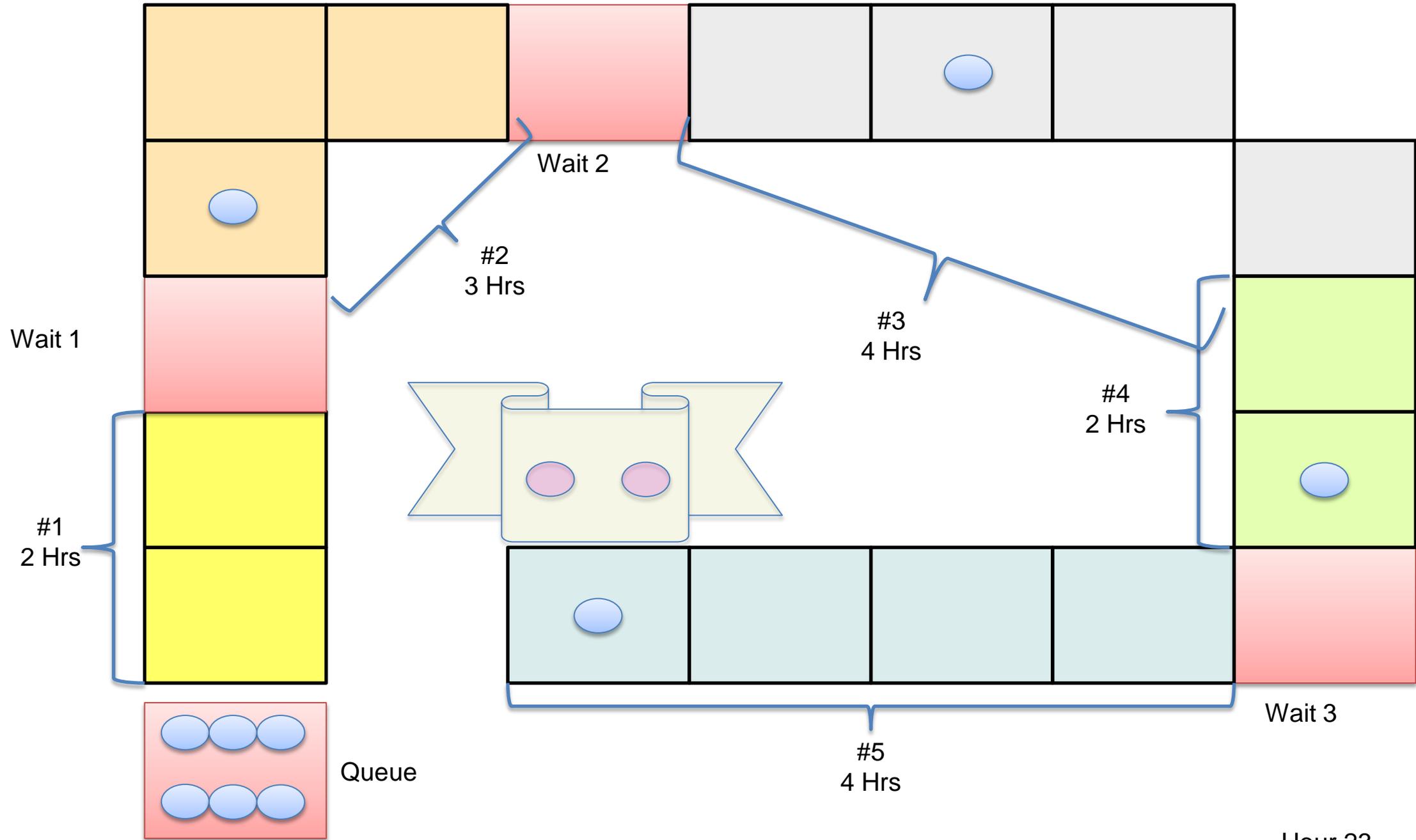
#4
2 Hrs

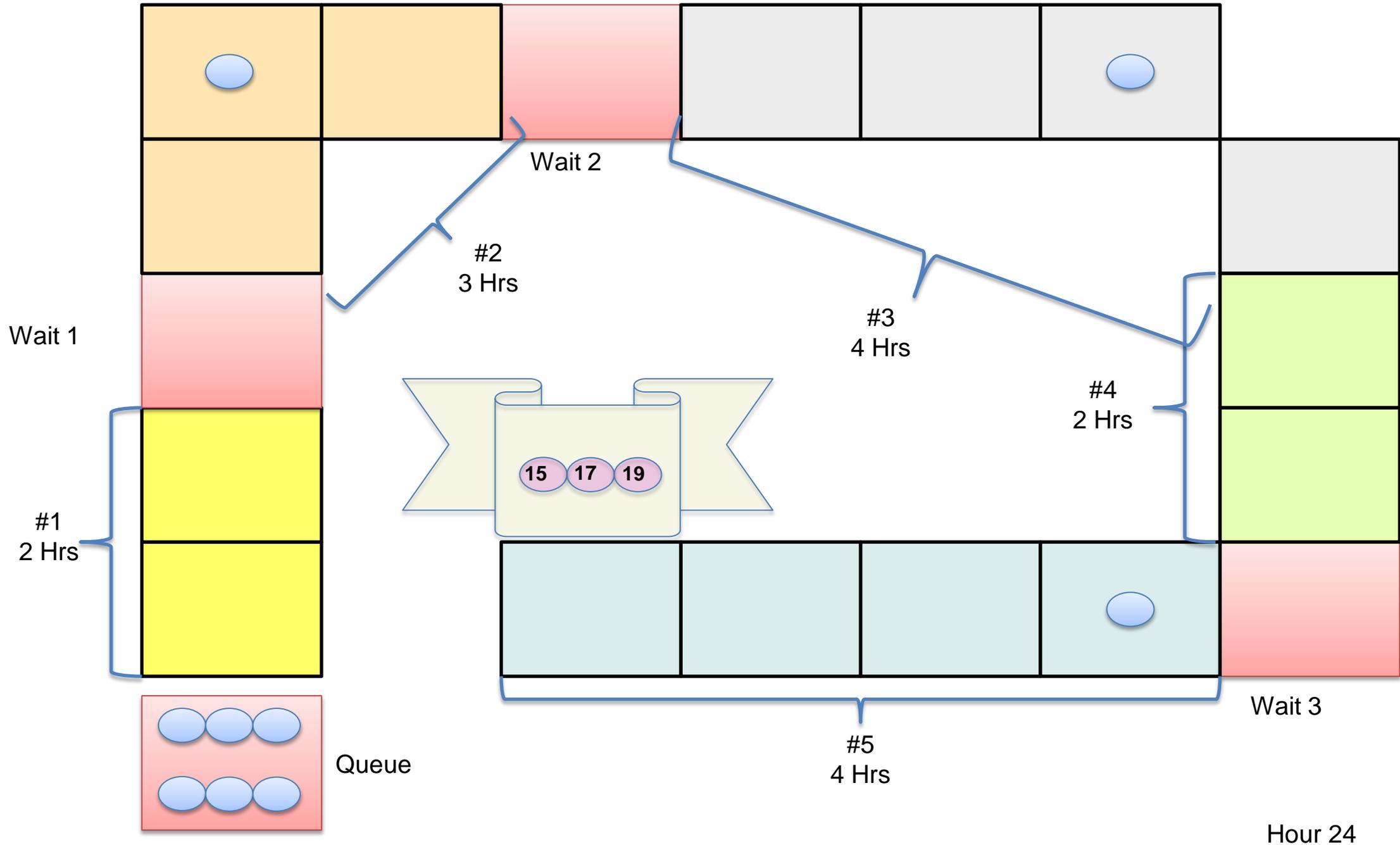
Wait 3

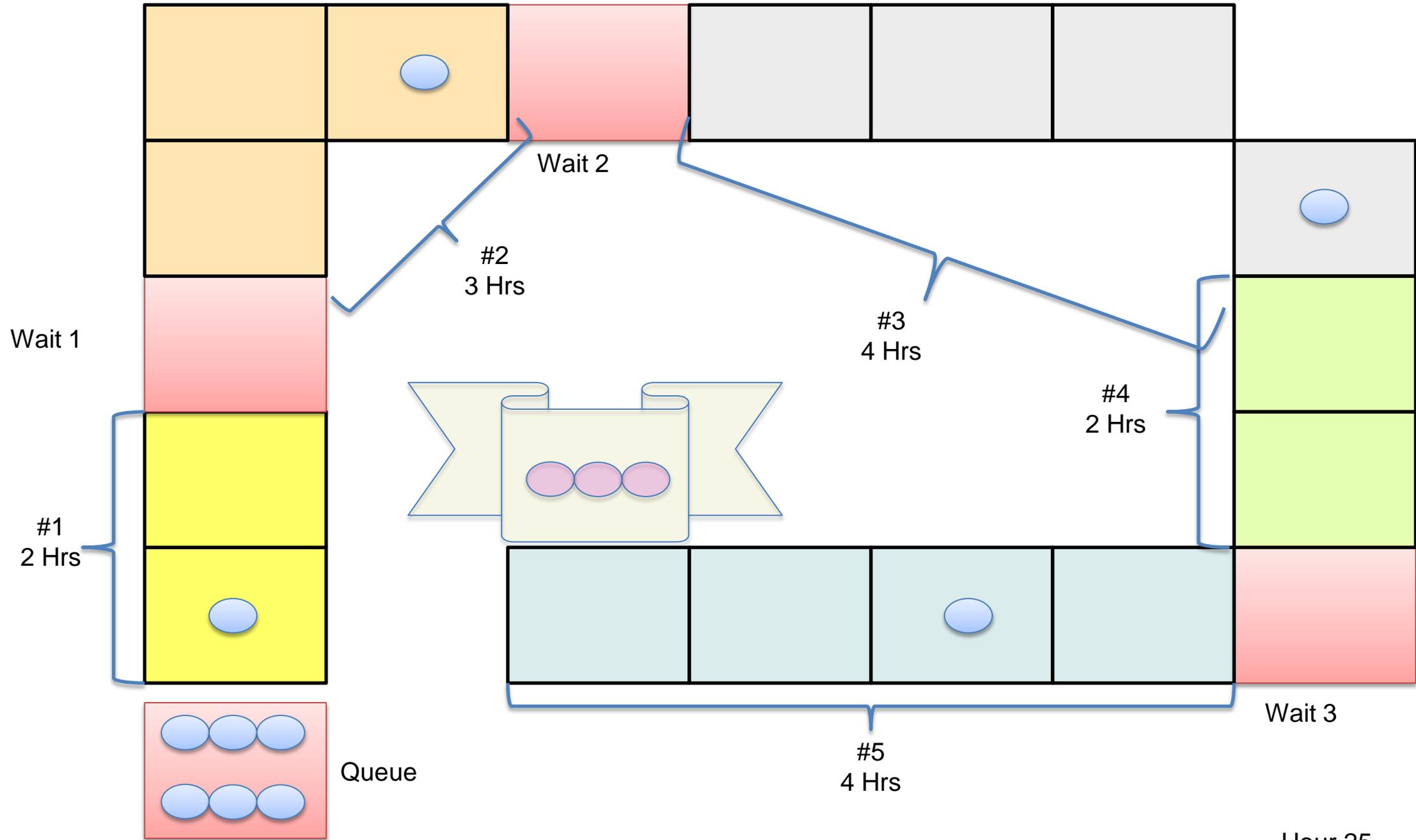
#5
4 Hrs

Hour 22

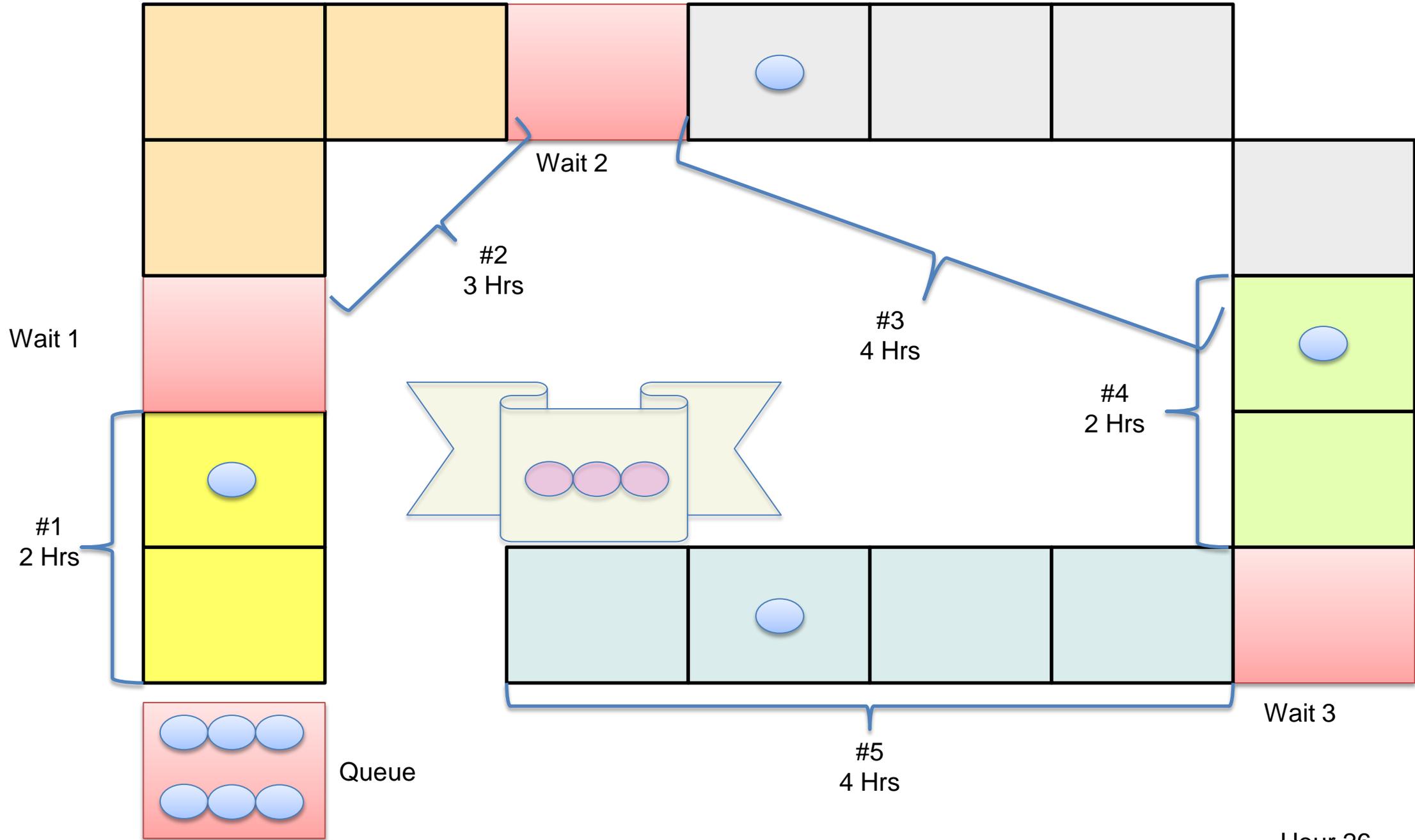


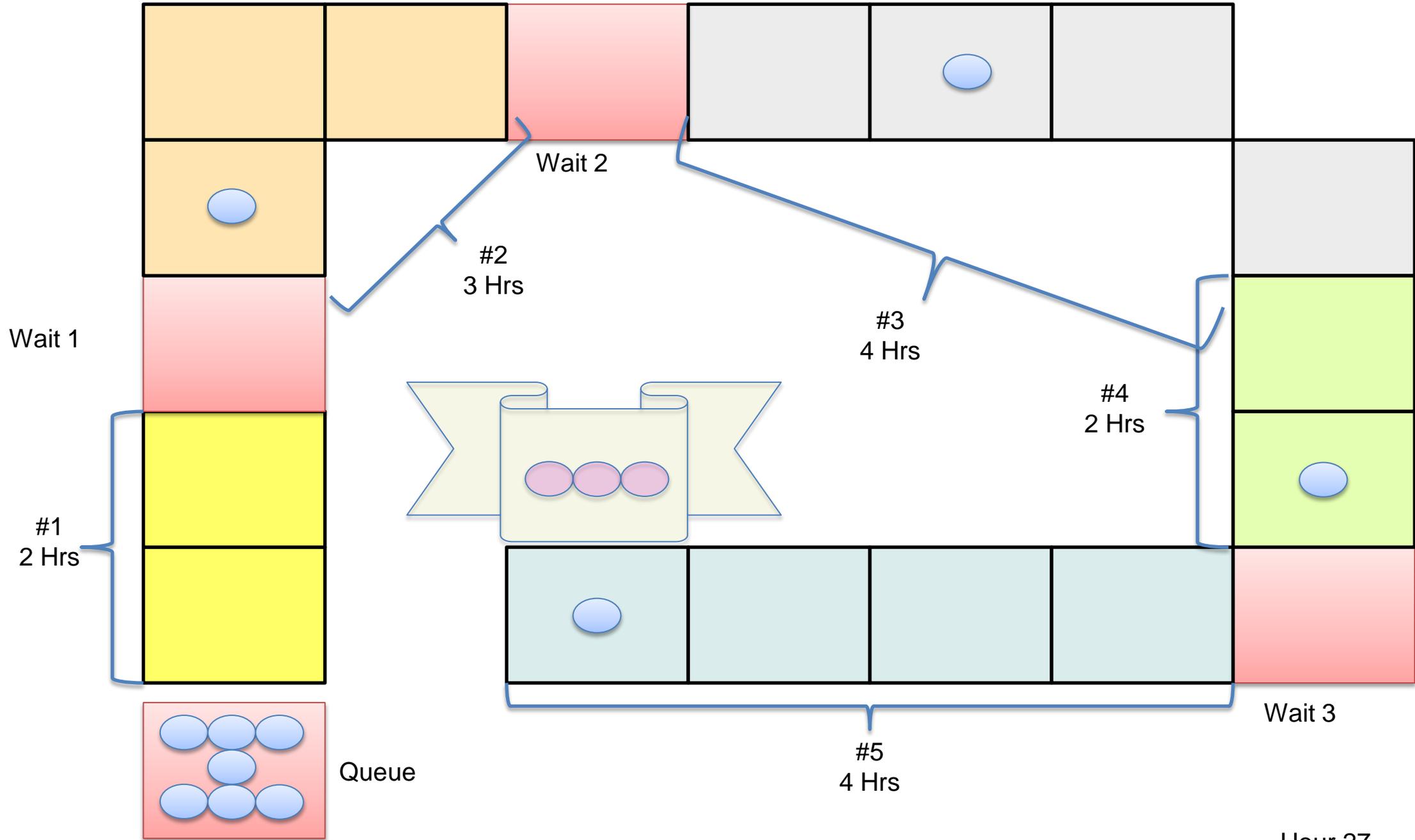


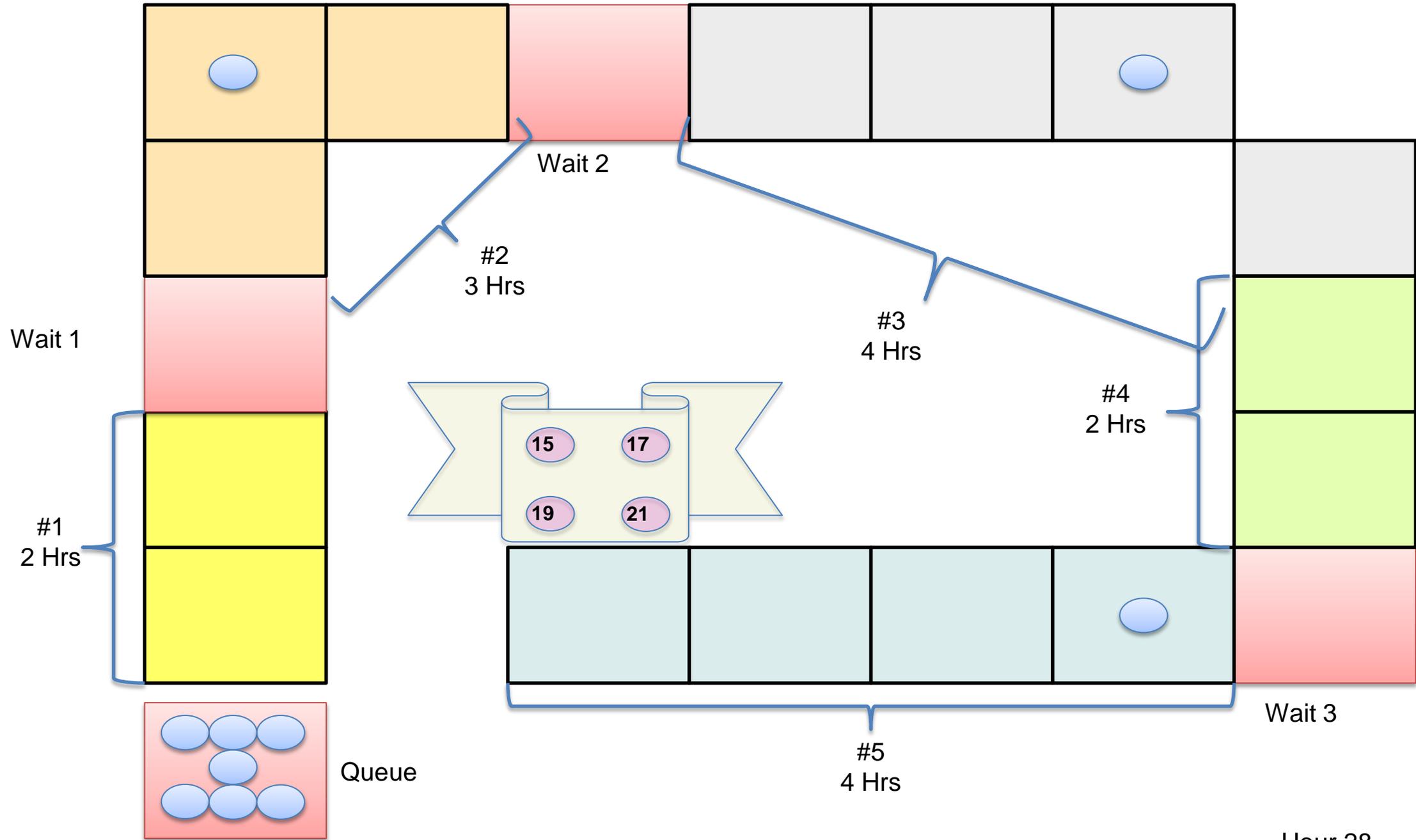




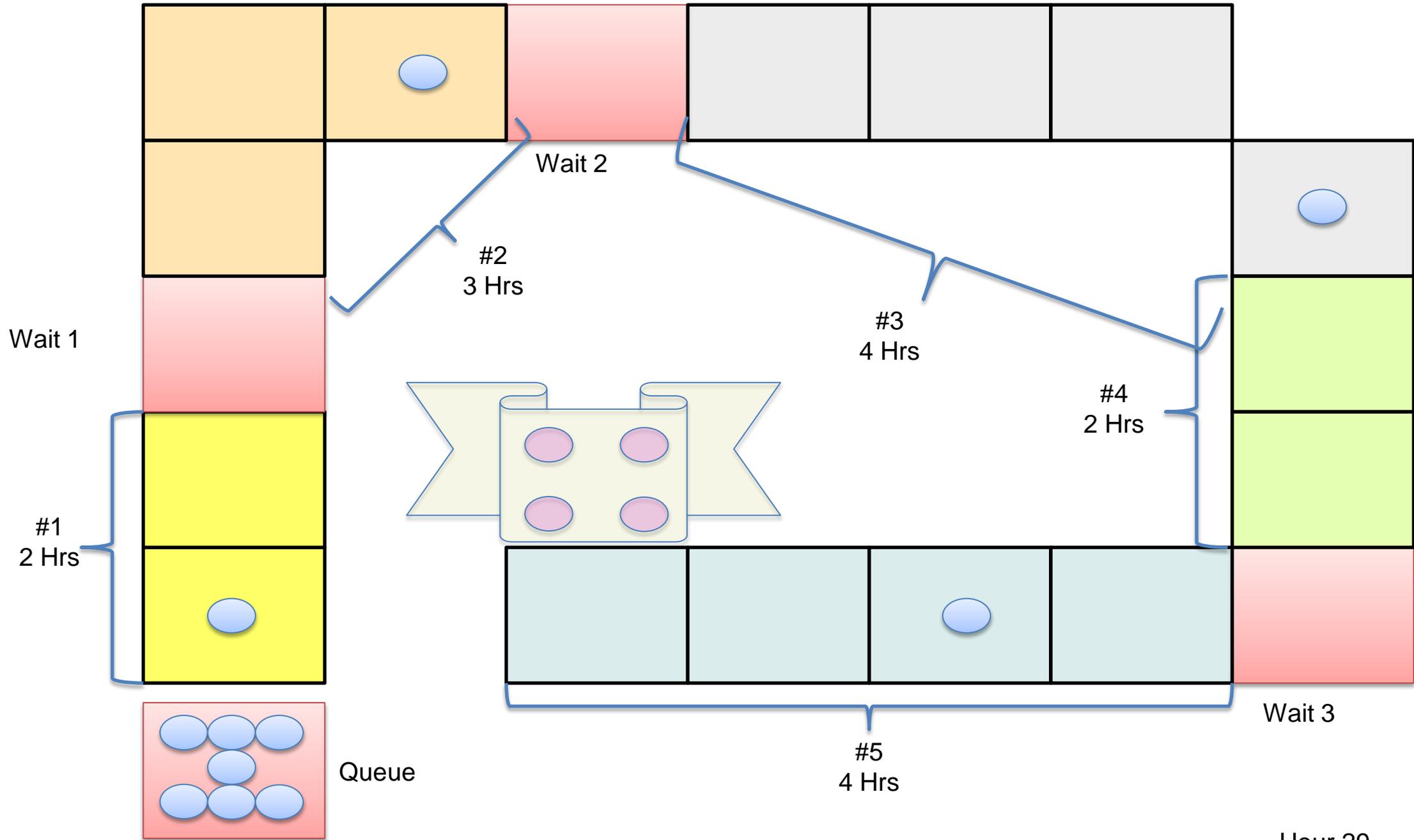
Hour 25

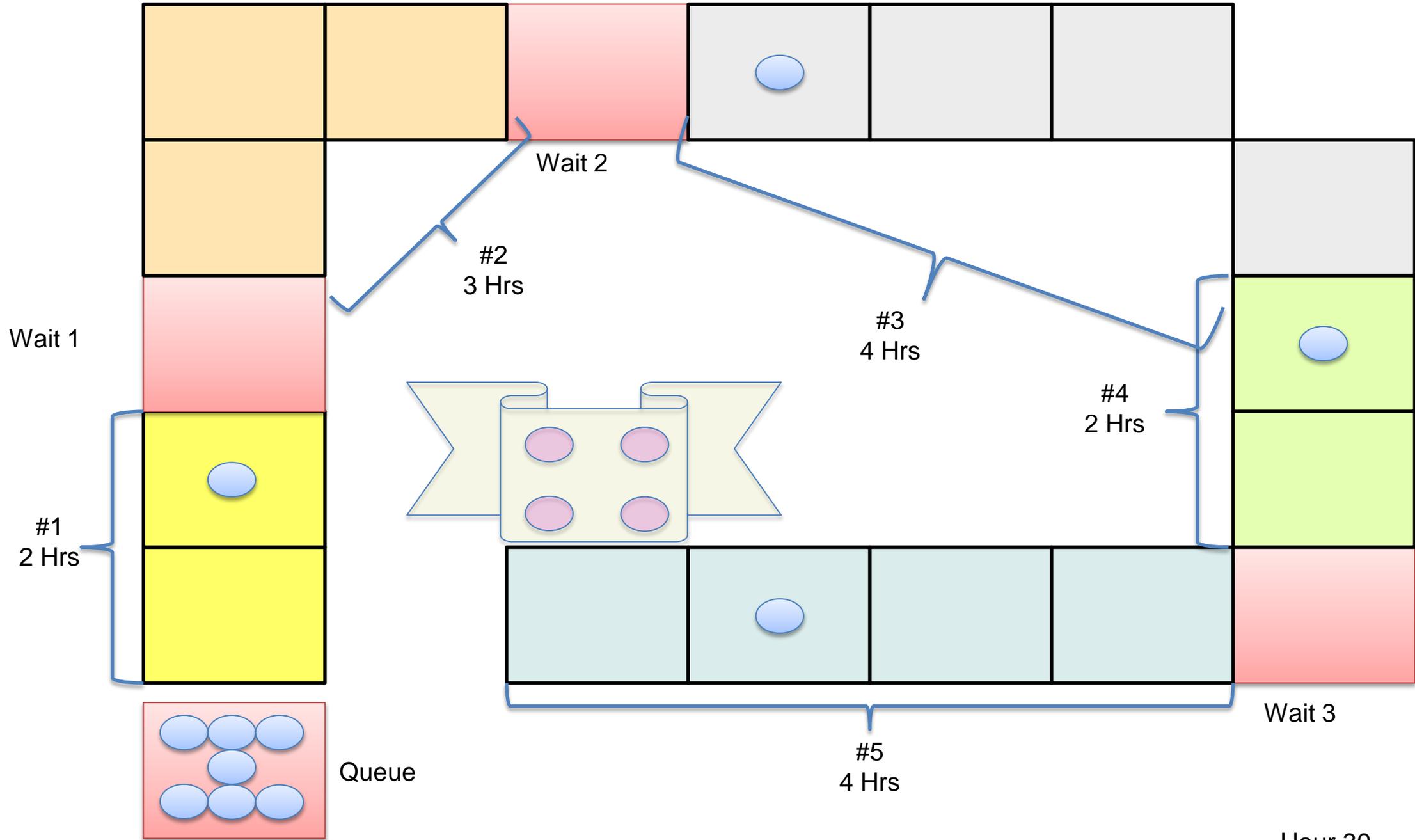




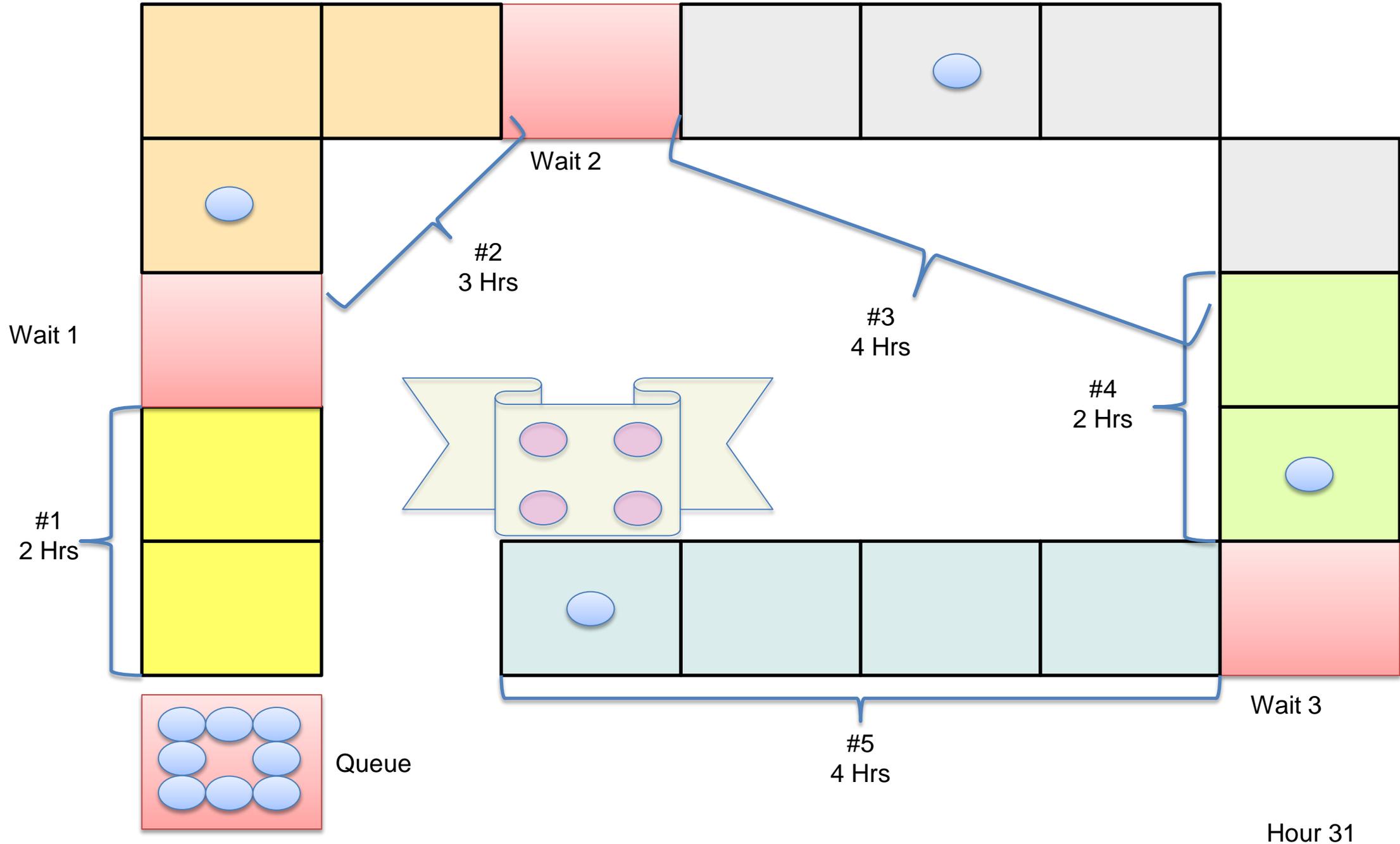


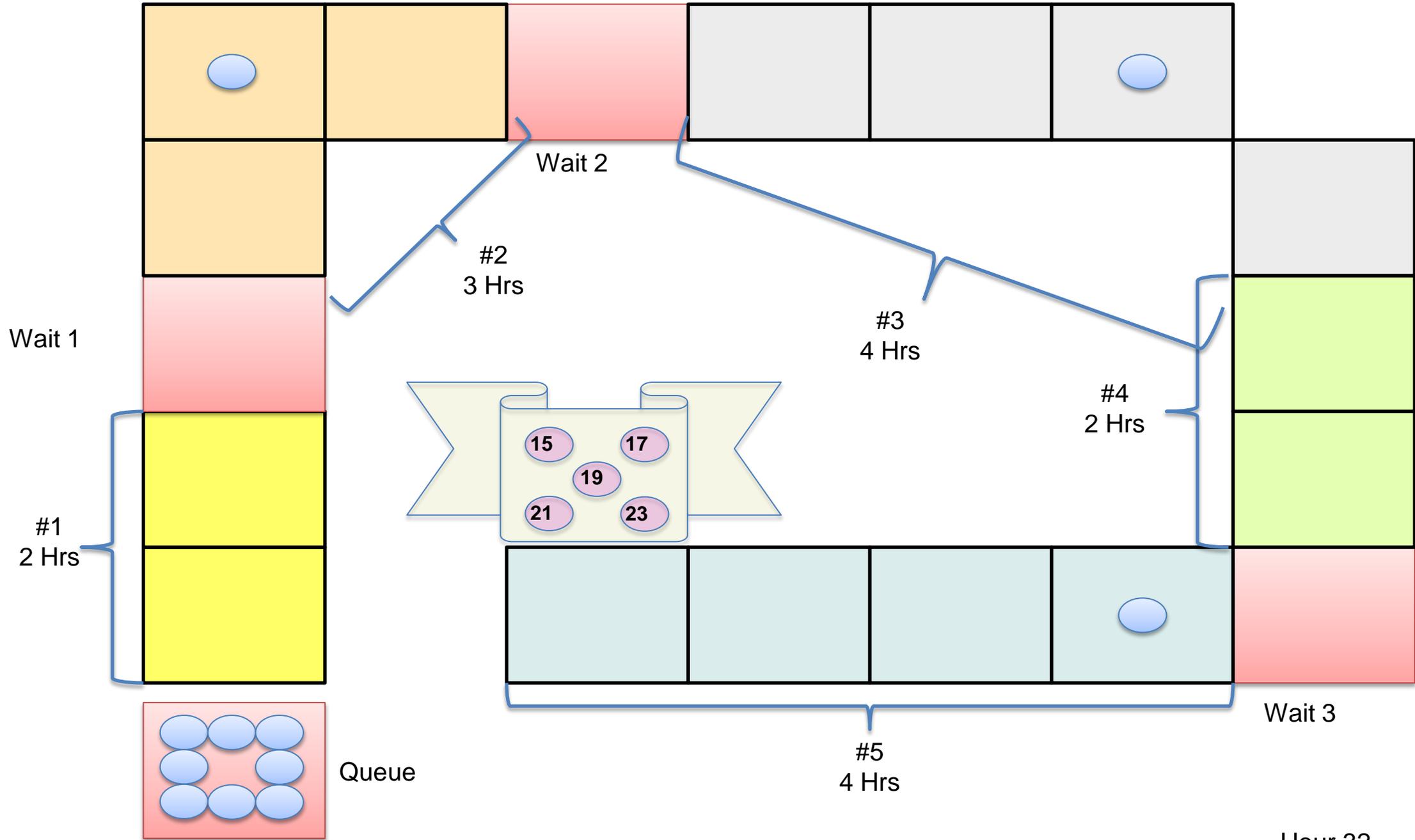
Hour 28

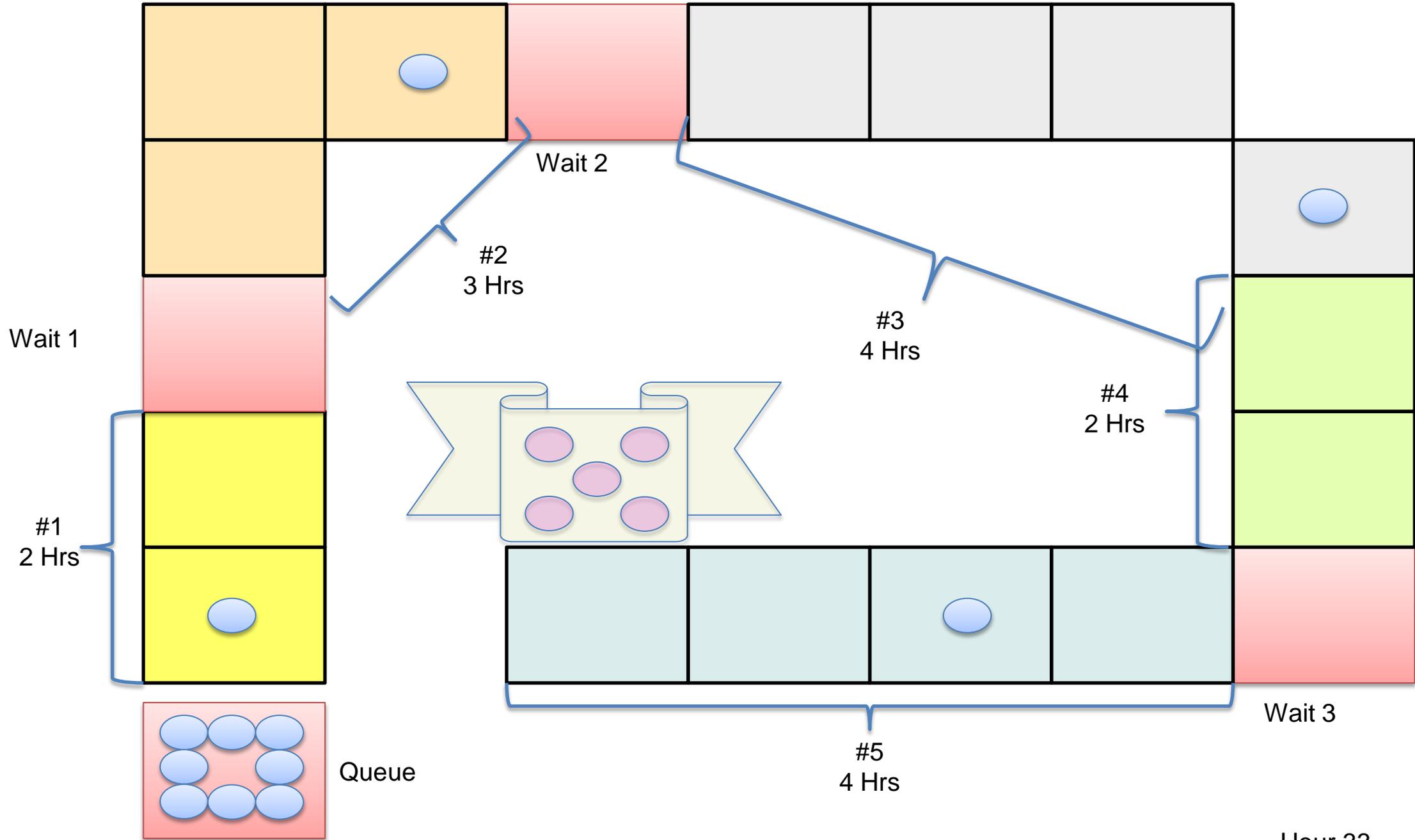




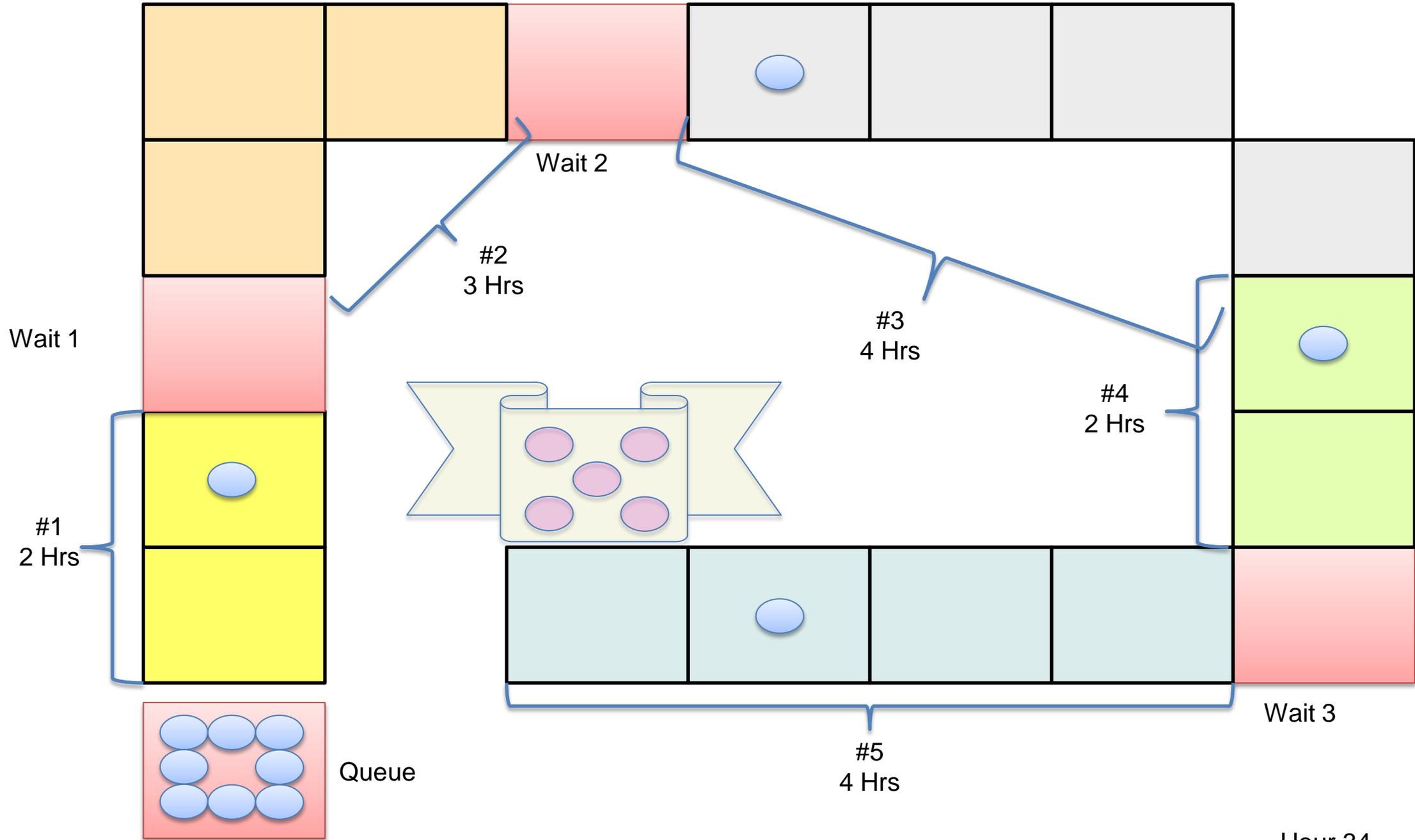
Hour 30

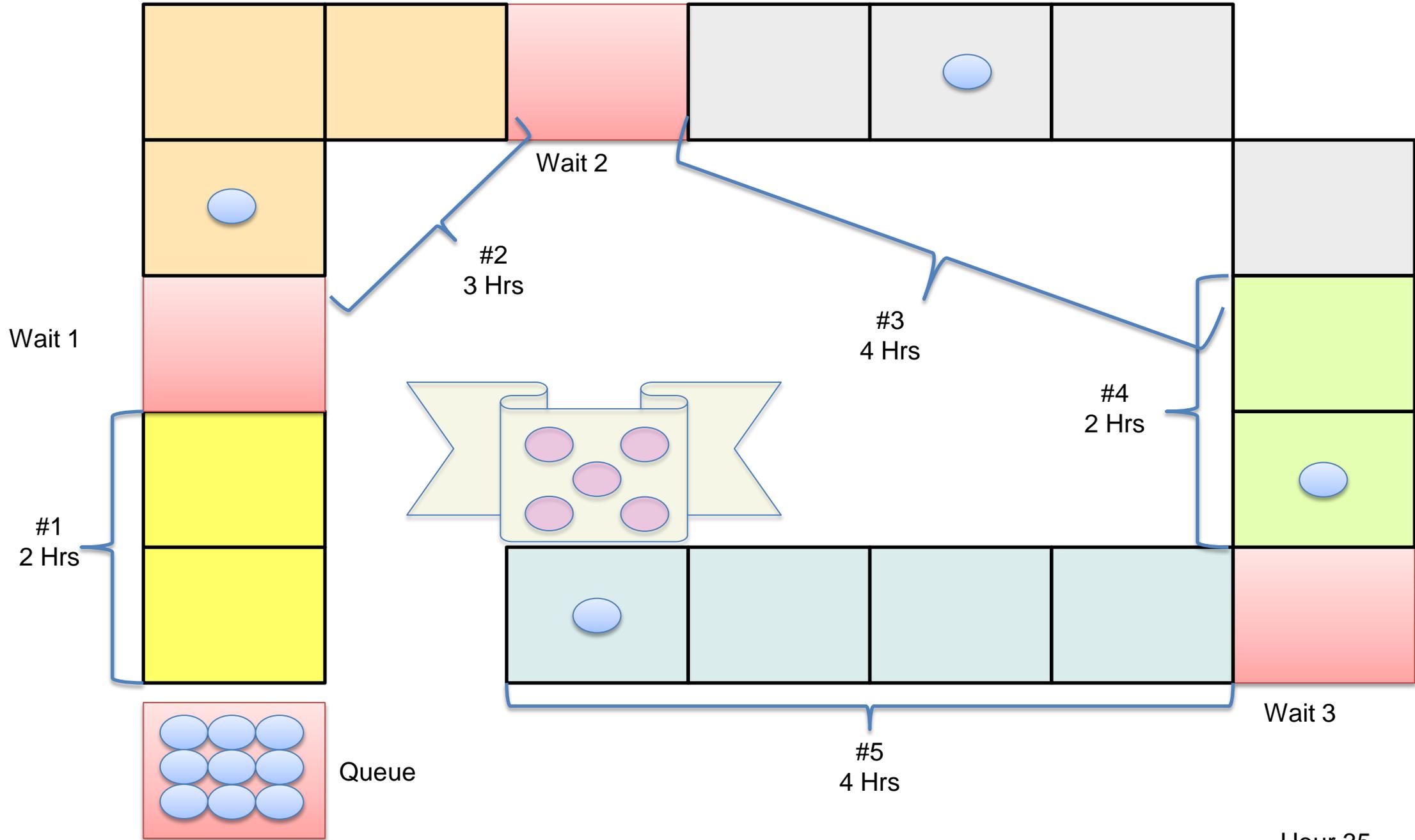


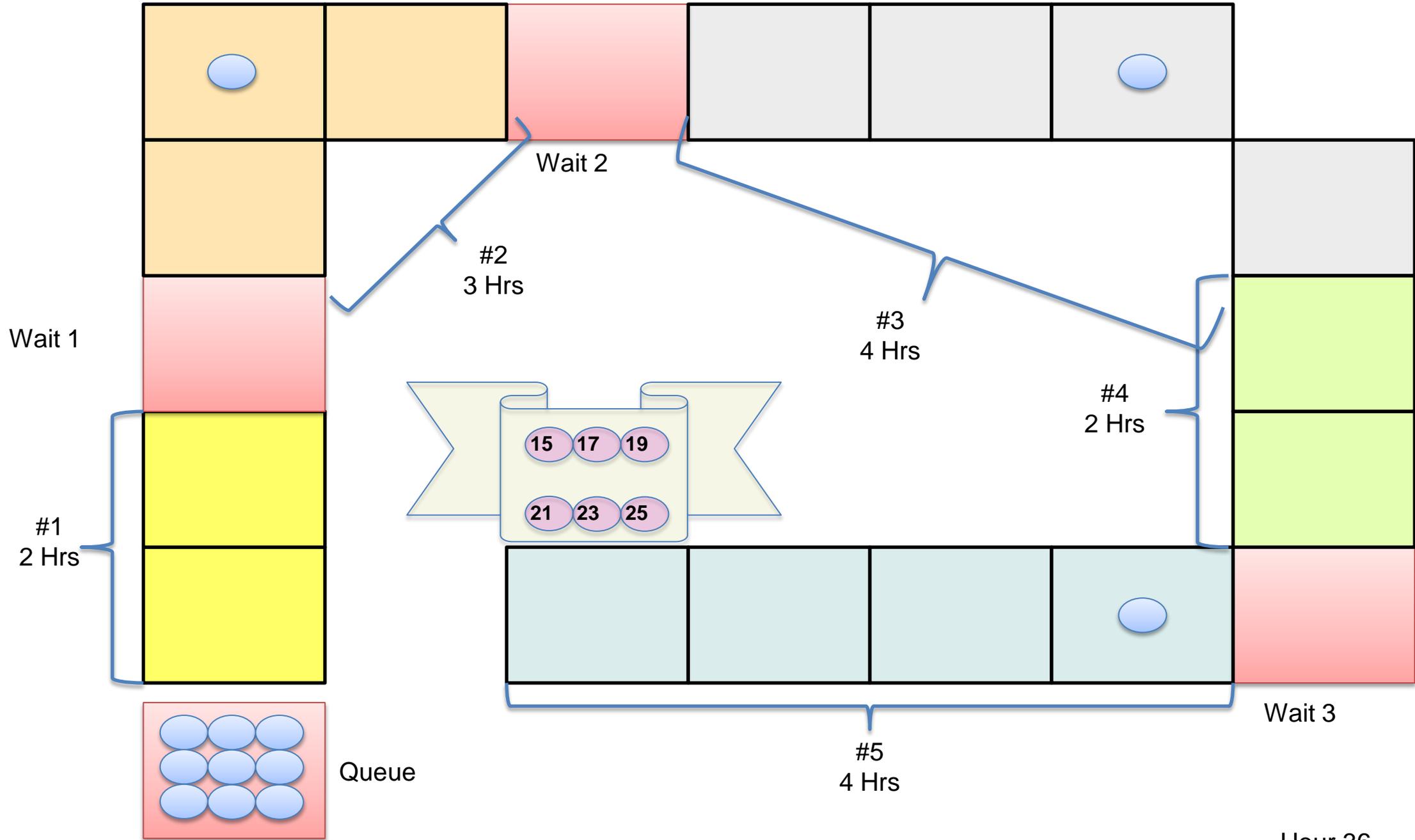




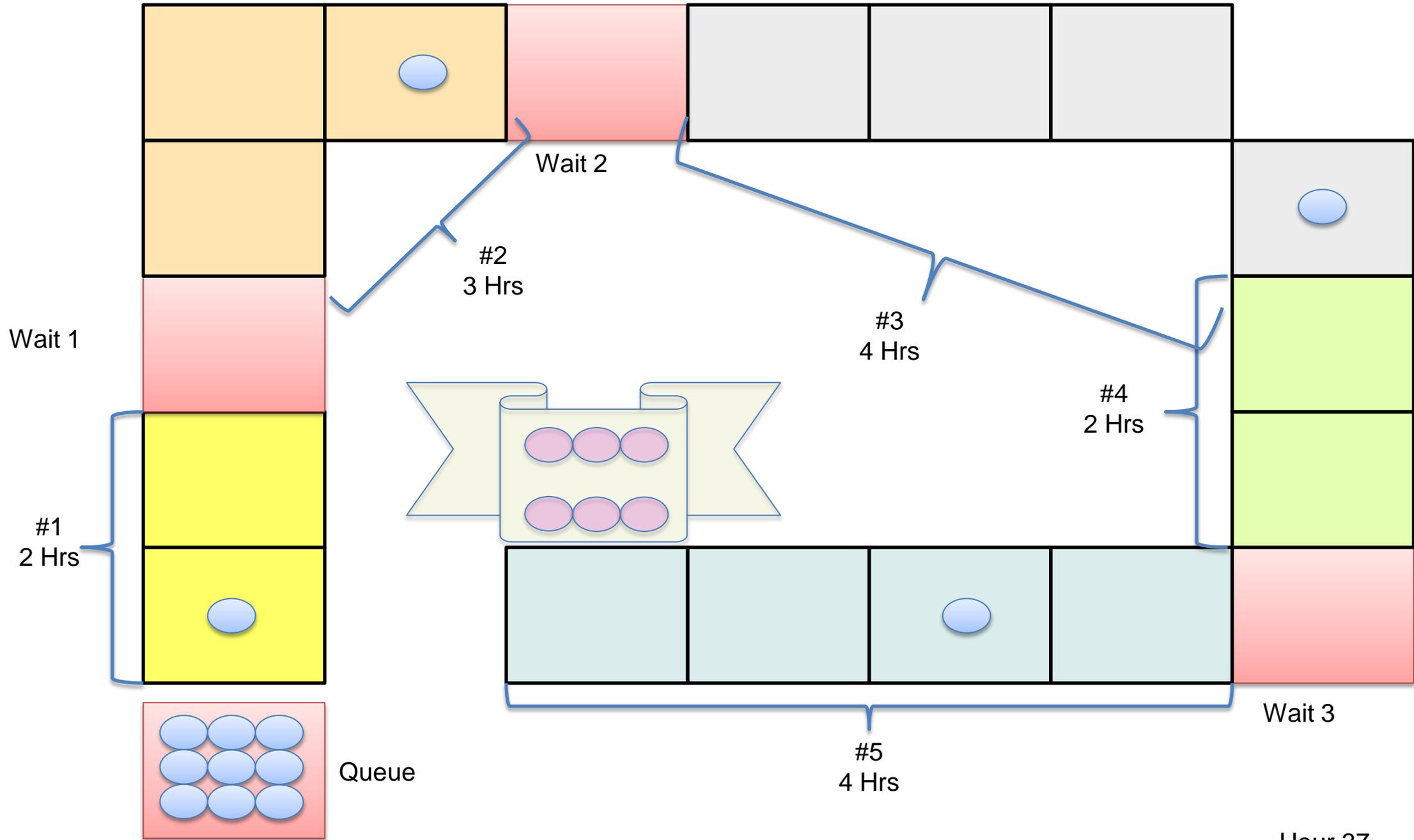
Hour 33



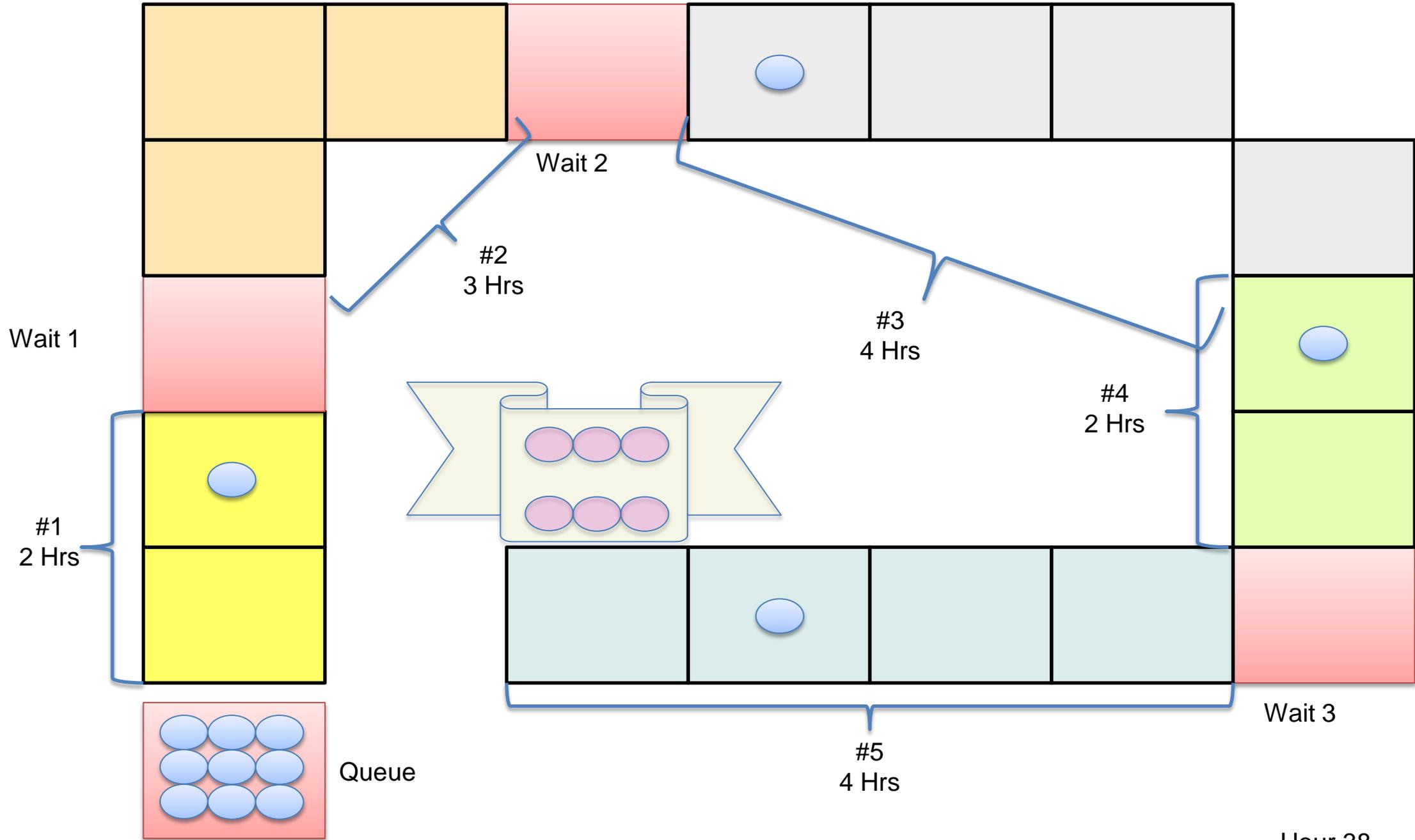




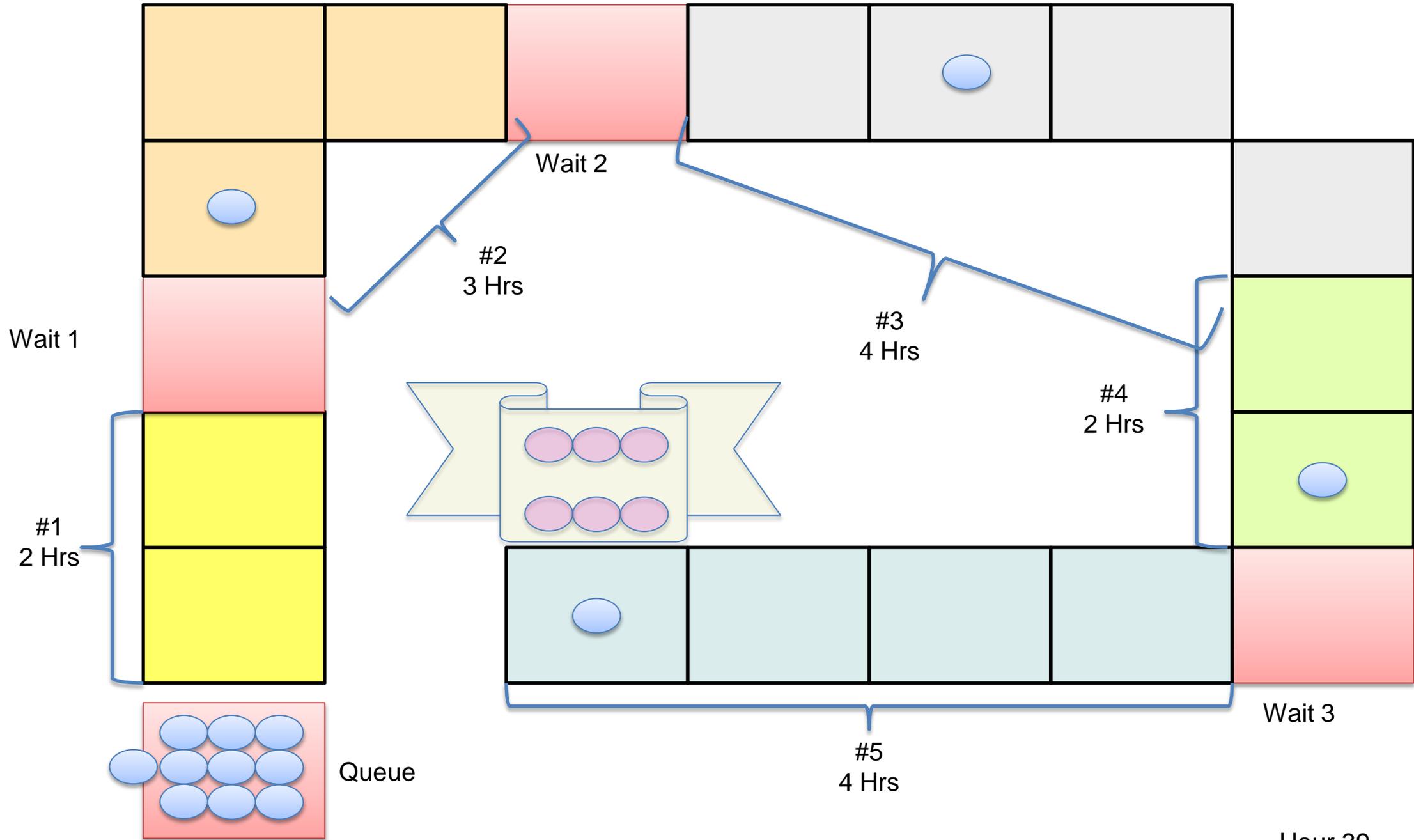
Hour 36

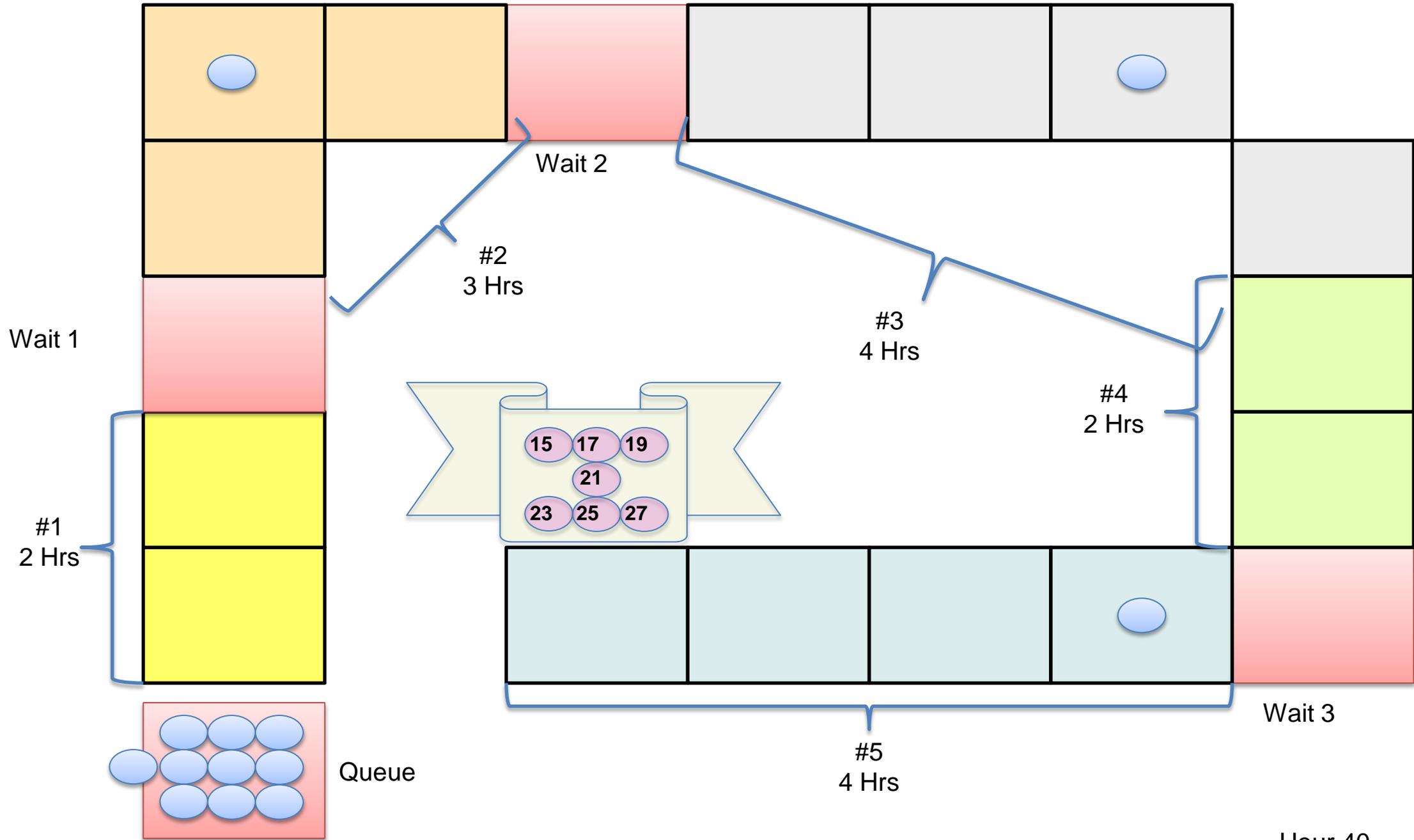


Hour 37

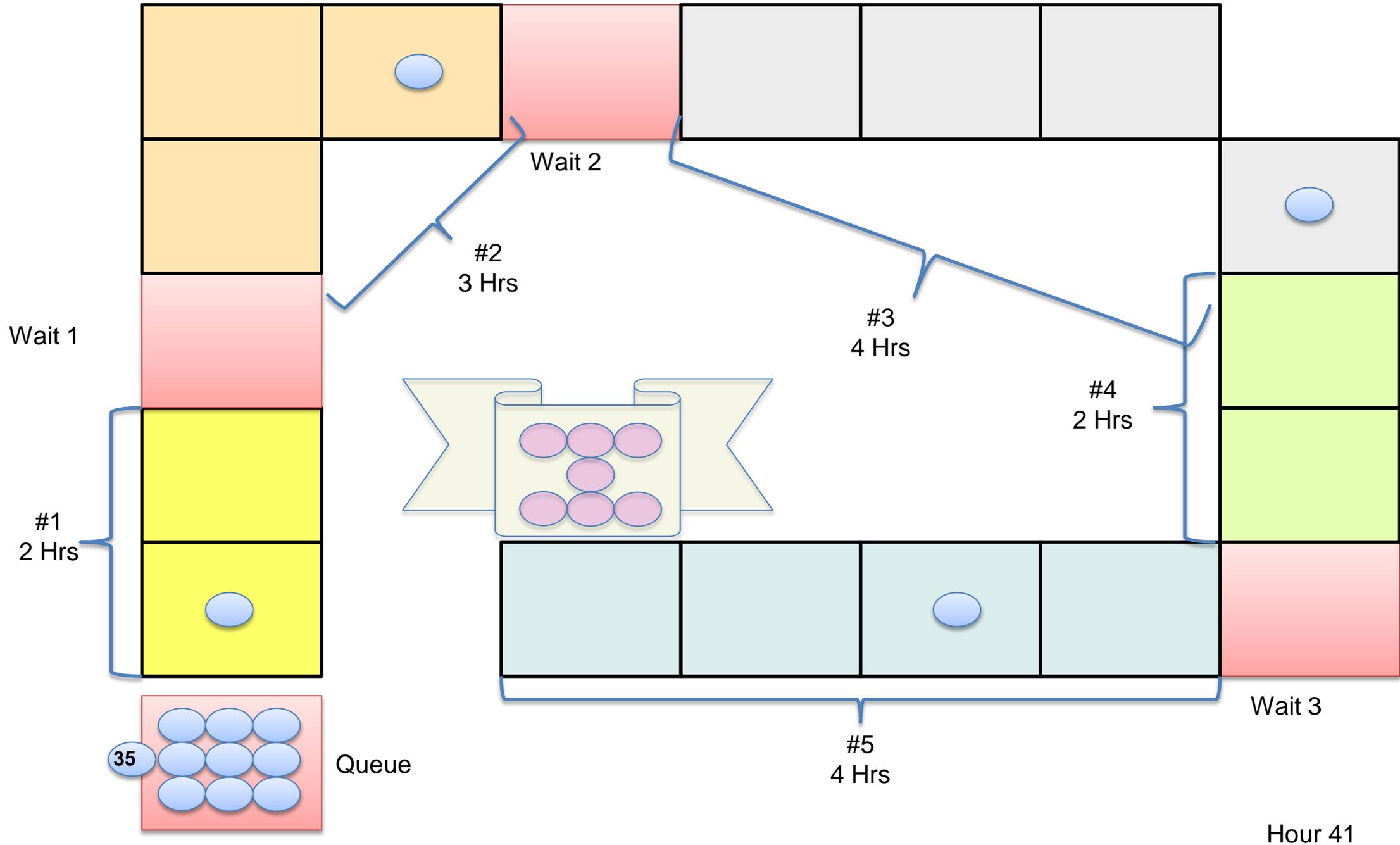


Hour 38

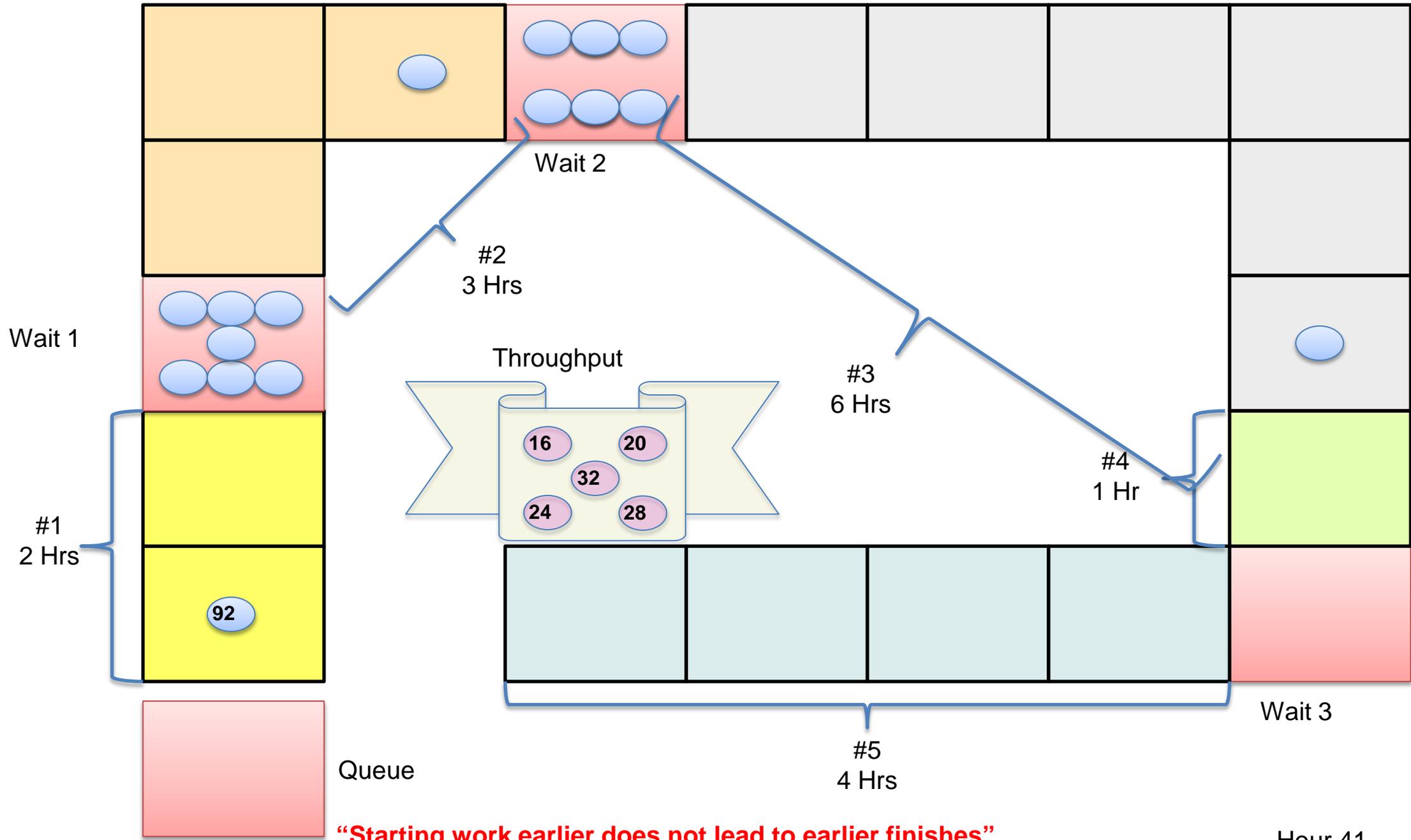




Hour 40



Hour 41



“Starting work earlier does not lead to earlier finishes”

John Little's Law

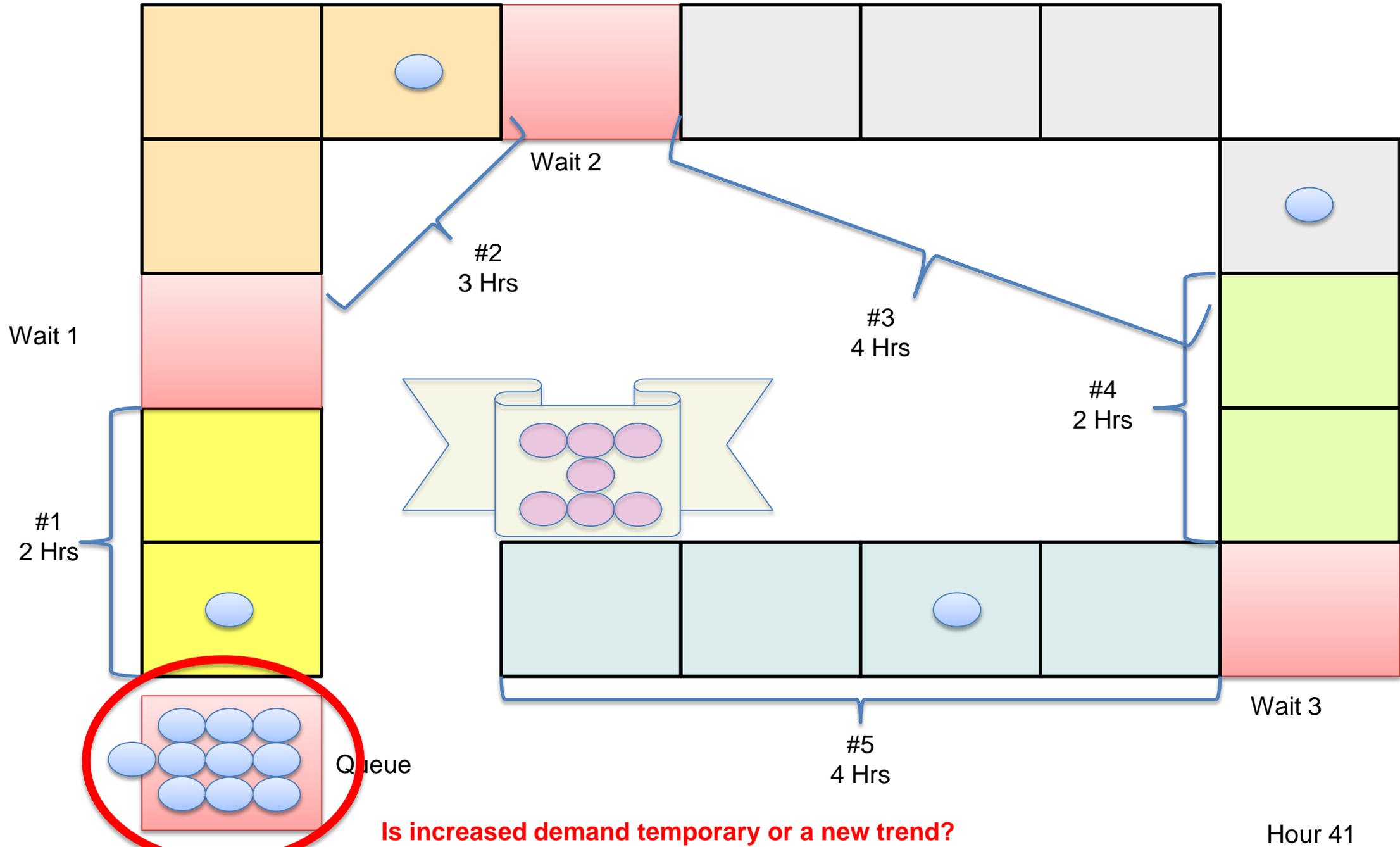
- $WIP = \text{Throughput Rate (TR)} \times \text{Lead Time (LT)}$
- In the second example:
 - TR = 2 units per day (1 unit every 4 hours)
 - LT = 1.875 days (1 unit every 15 hours)
 - $2 \times 1.875 = 3.75$
 - Optimal WIP is 3.75 units

WIP and Costs per Unit

- The way WIP and flow are managed impacts the fixed costs per unit. In the first example, assume:
 - Fixed costs are for operating expenses based on 5 FTE's
 - The hourly rate is \$60 (includes overhead)
 - Therefore, total fixed costs per week are \$12,000
 - The throughput rate is one unit every six hours or 6.67 units per week ($40 / 6$)
 - The cost per unit is \$1,800 ($\$12,000 / 6.67$)

WIP and Costs per Unit

- In the second example:
 - Total fixed costs are unchanged at \$12,000 per week
 - The throughput rate is one unit every four hours or 10 units per week ($40 / 4$)
 - The cost per unit is \$1,200 ($\$12,000 / 10$)
- That's great!
- But we may still have a problem ...

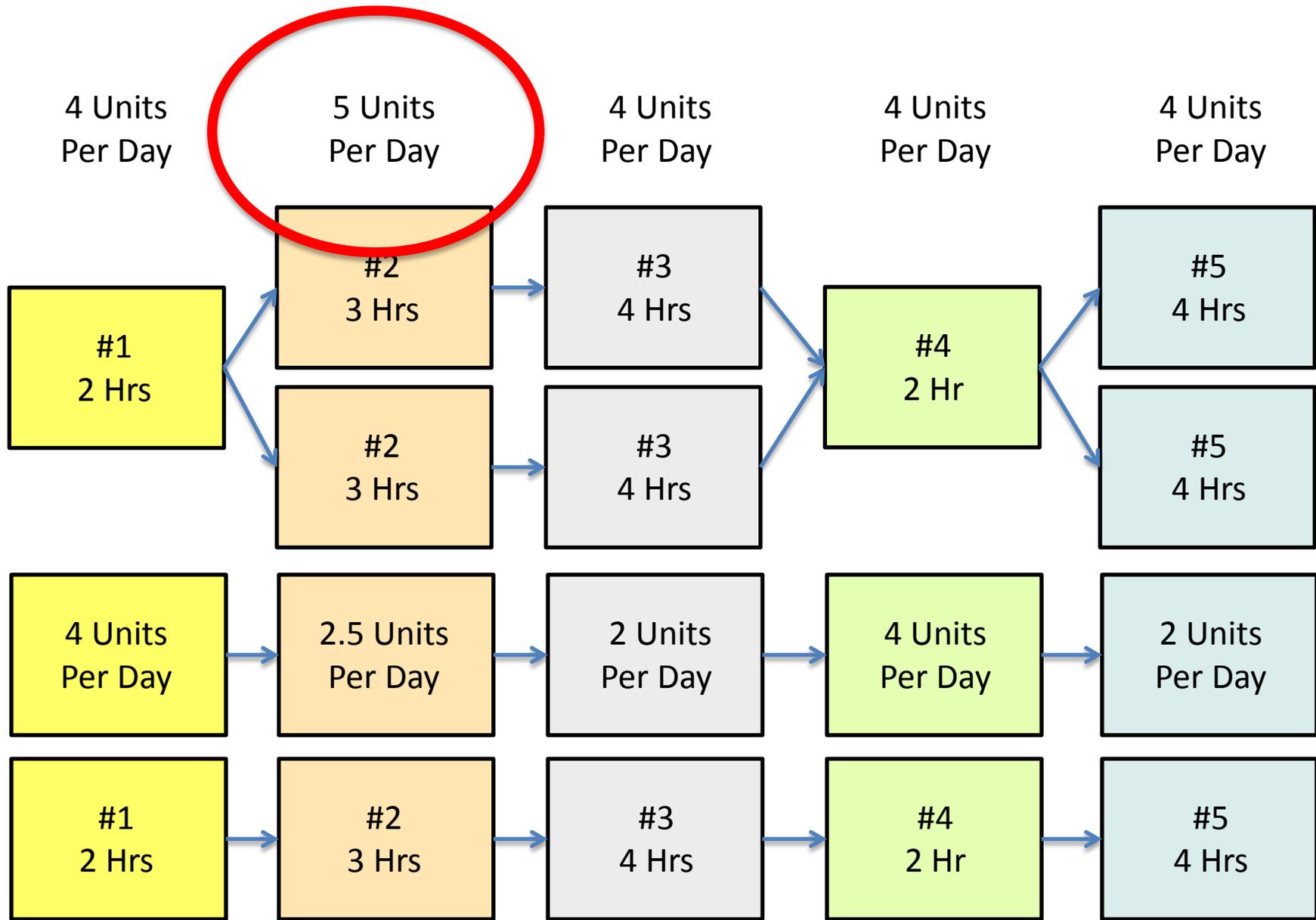


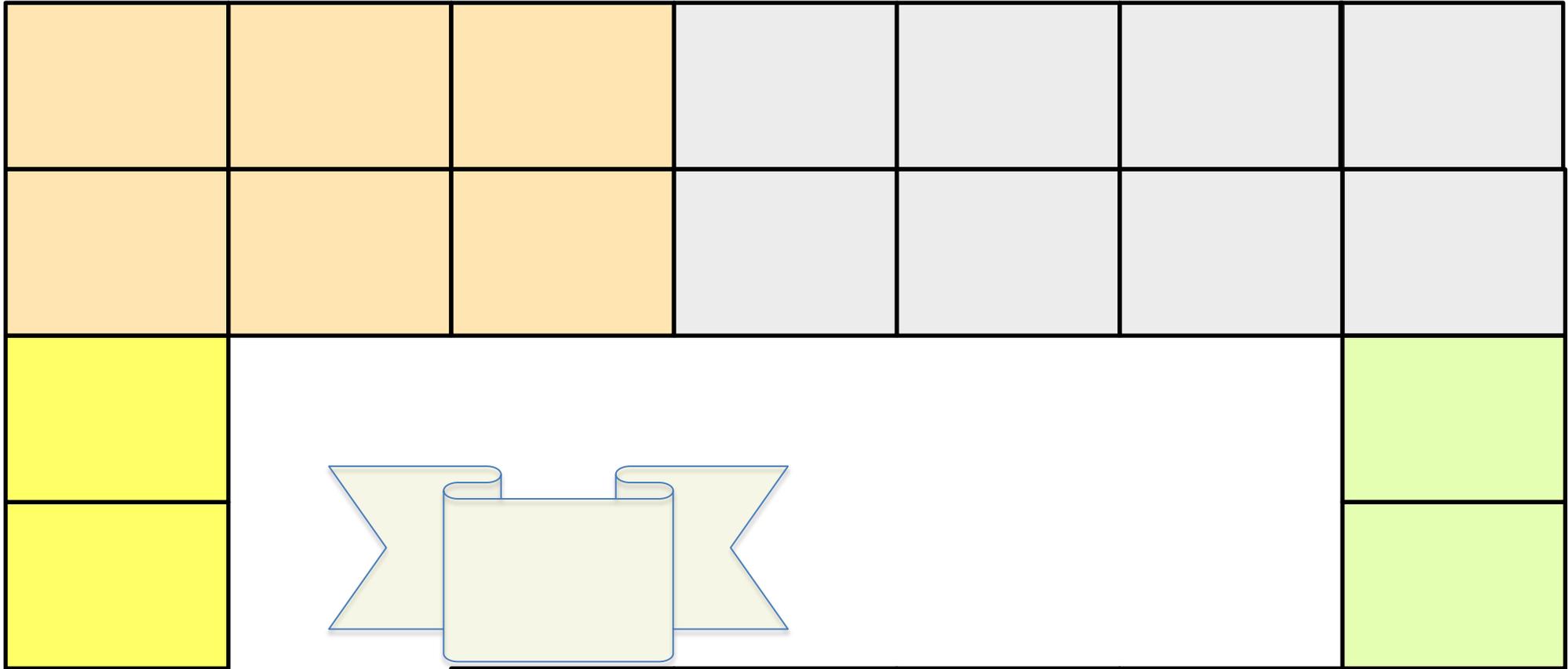
Is increased demand temporary or a new trend?

Hour 41

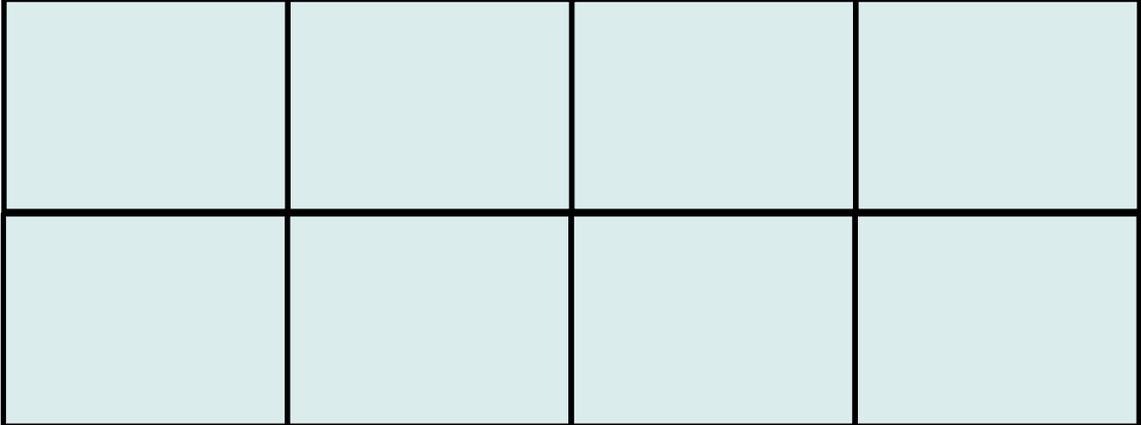
Capacity and Synergy

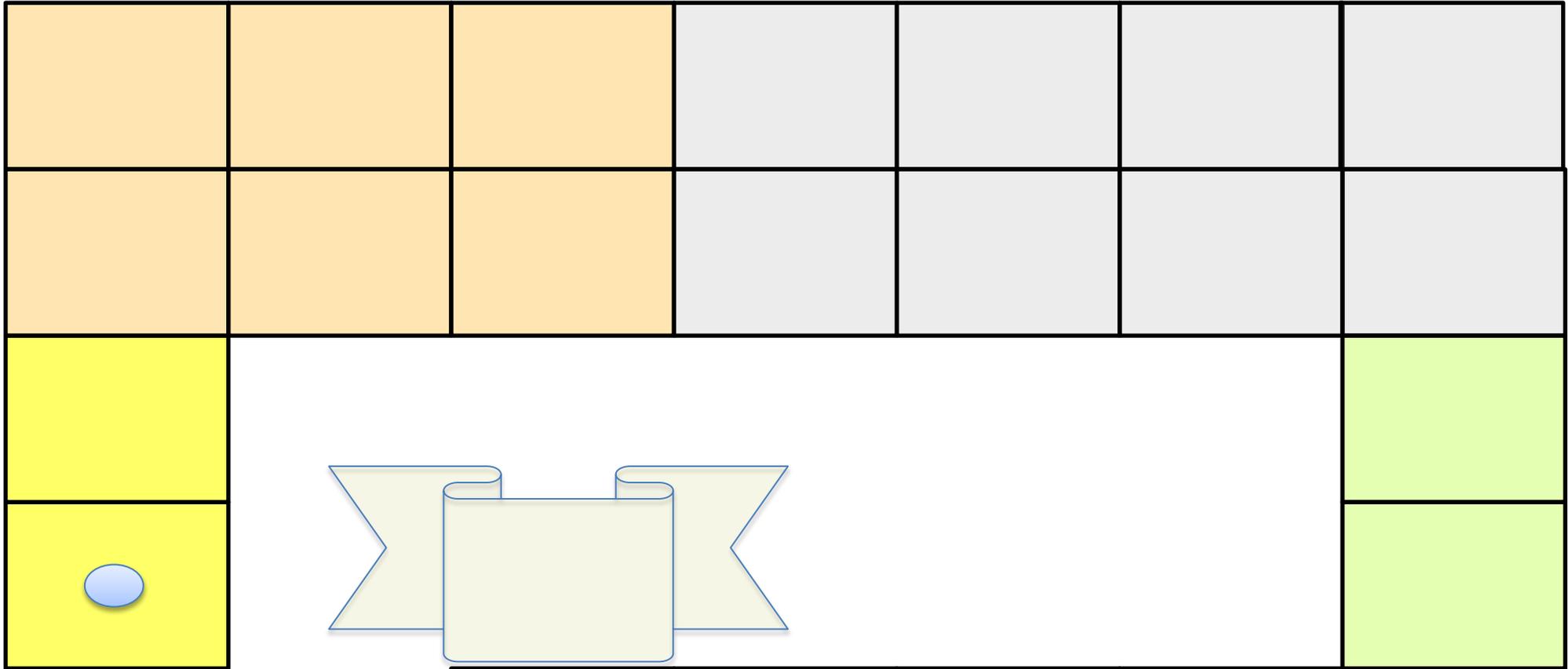
- Assume that we have maximized the flow of the existing system, staff are fully trained, and enhancements to technology show insufficient return on investment
- Management could simply double the team (investment) and maintain the same cost per unit with twice the throughput; however, there's an opportunity for synergy
- Elevate the constraint(s) – Only after flow has been maximized do we consider adding resources. TOC avoids increasing costs unless the investment improves quality and/or increases throughput



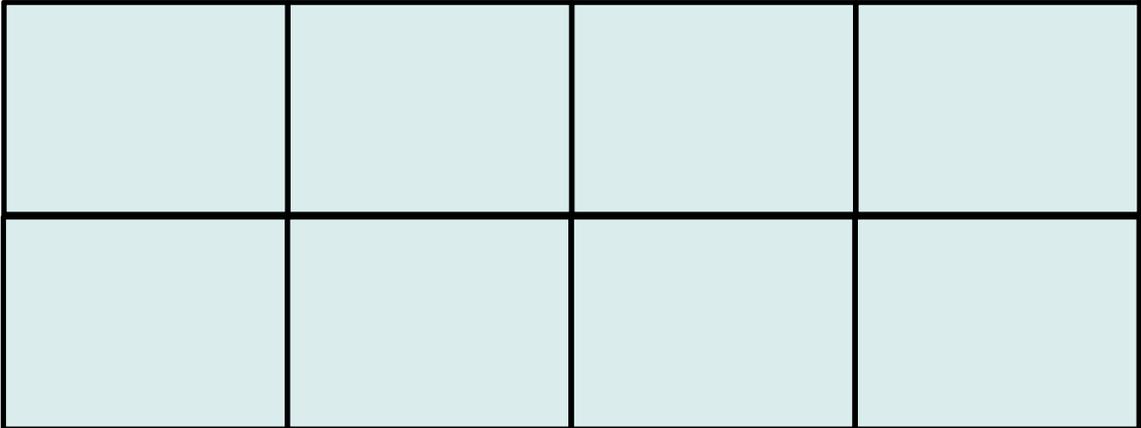


Queue

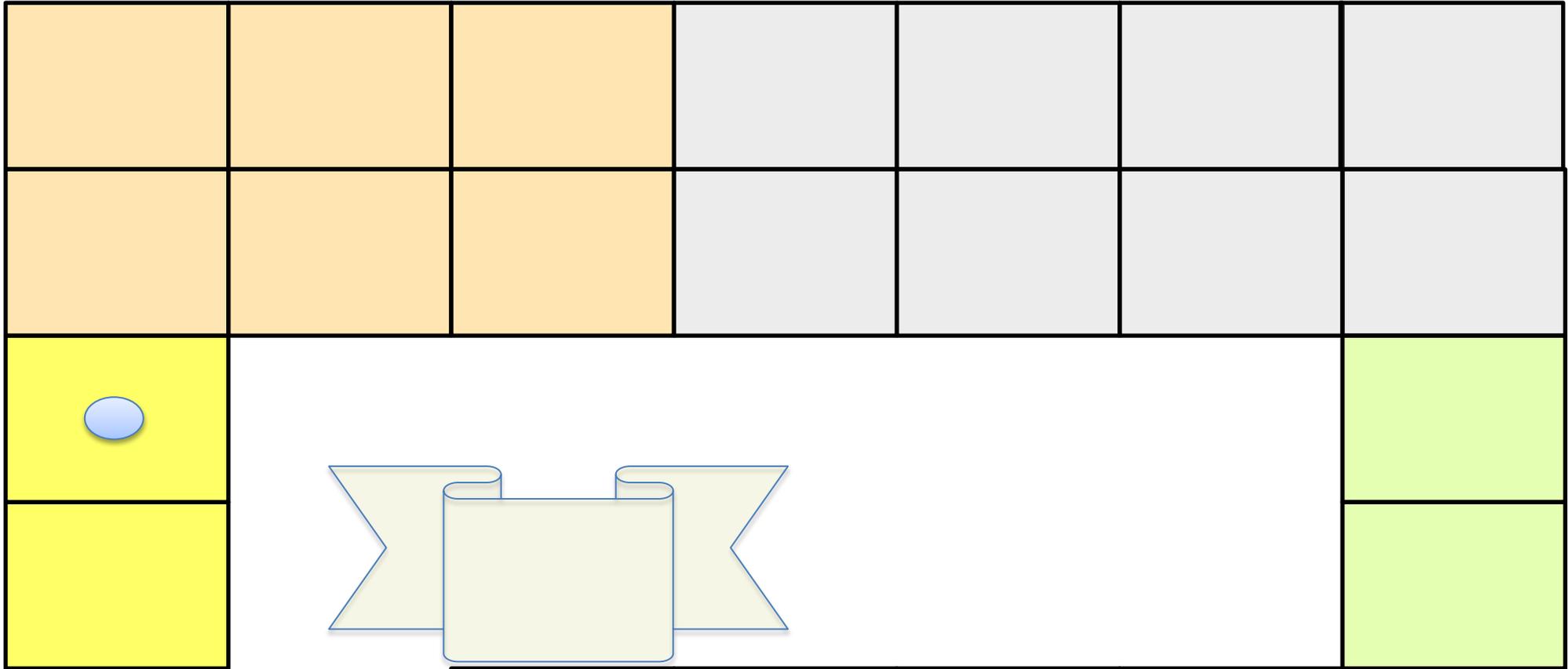




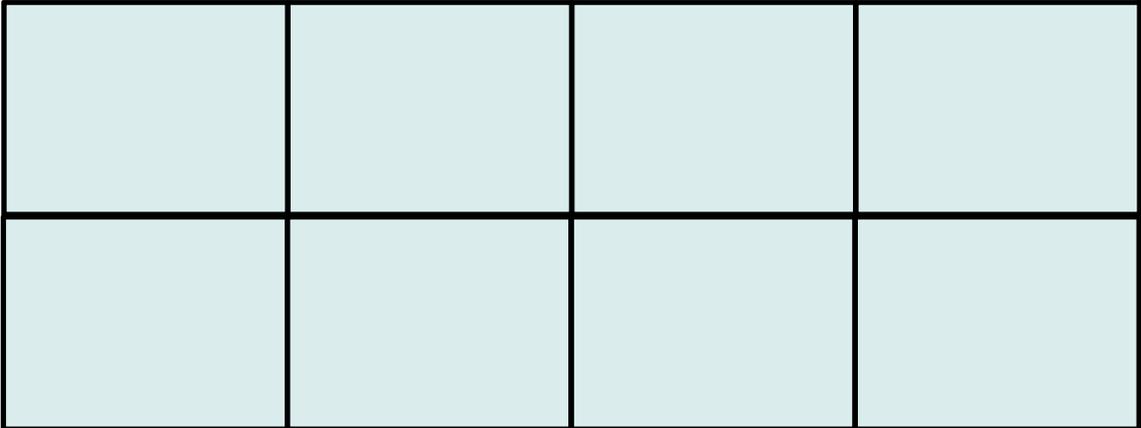
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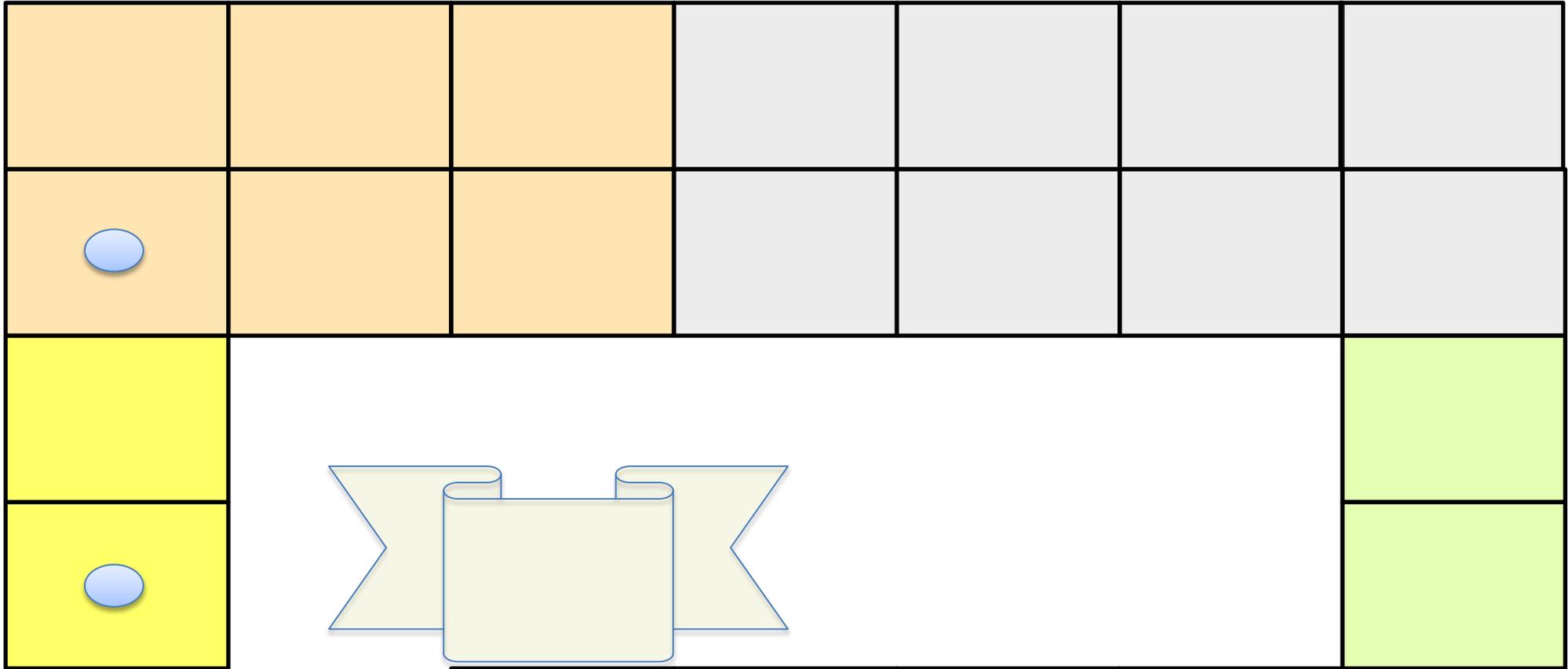
Hour 1



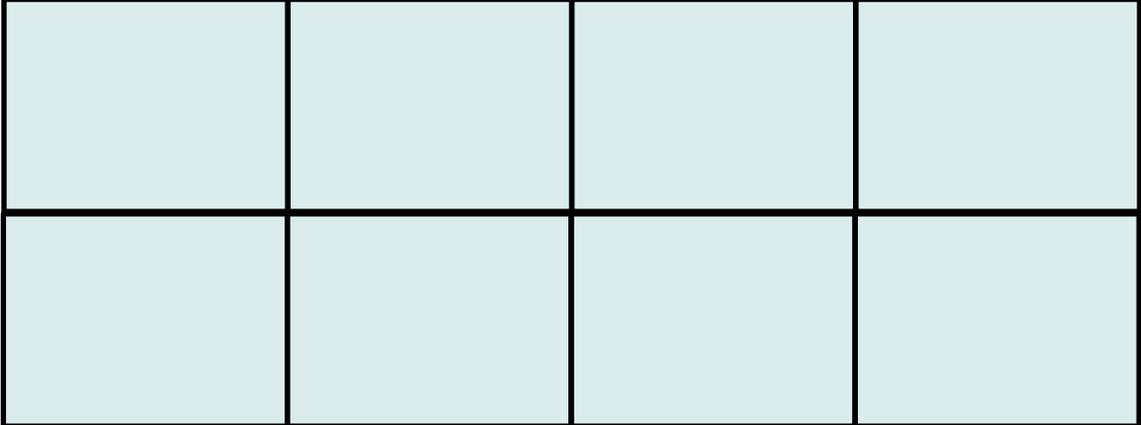
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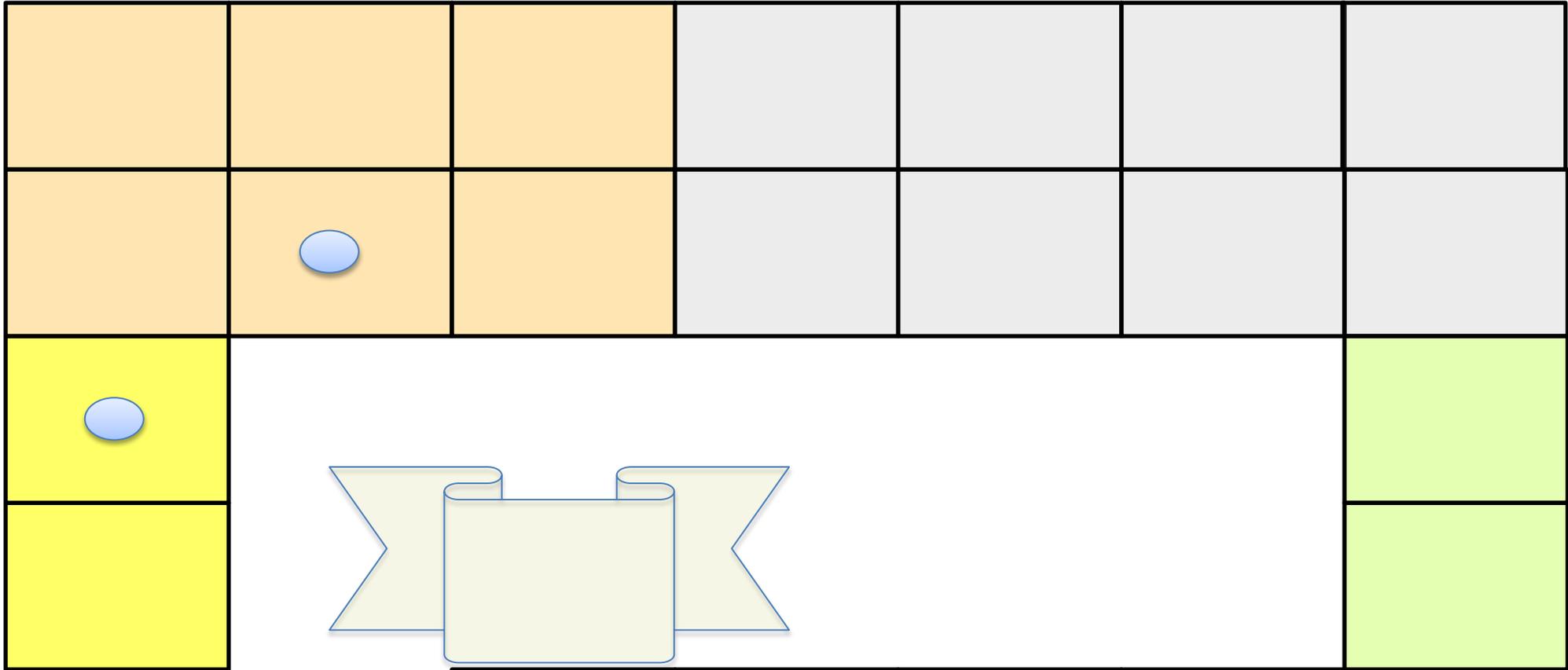
Hour 2



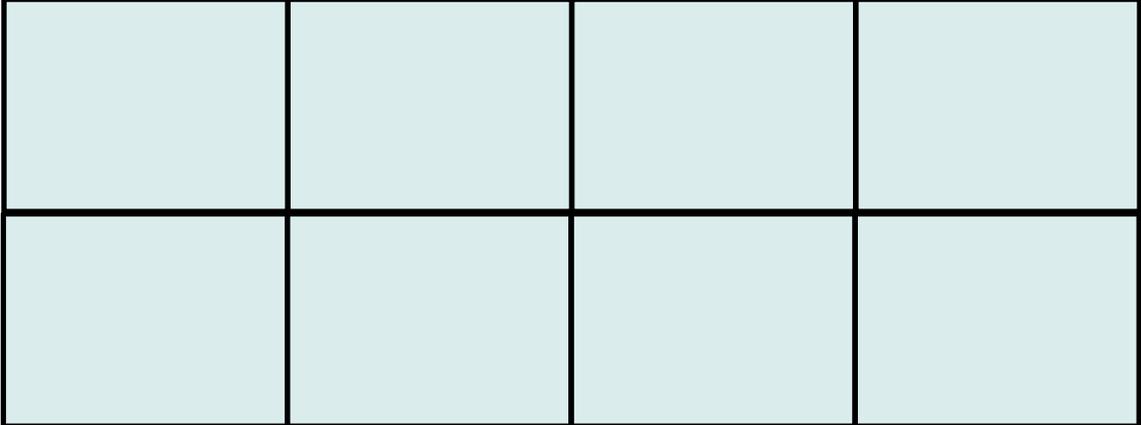
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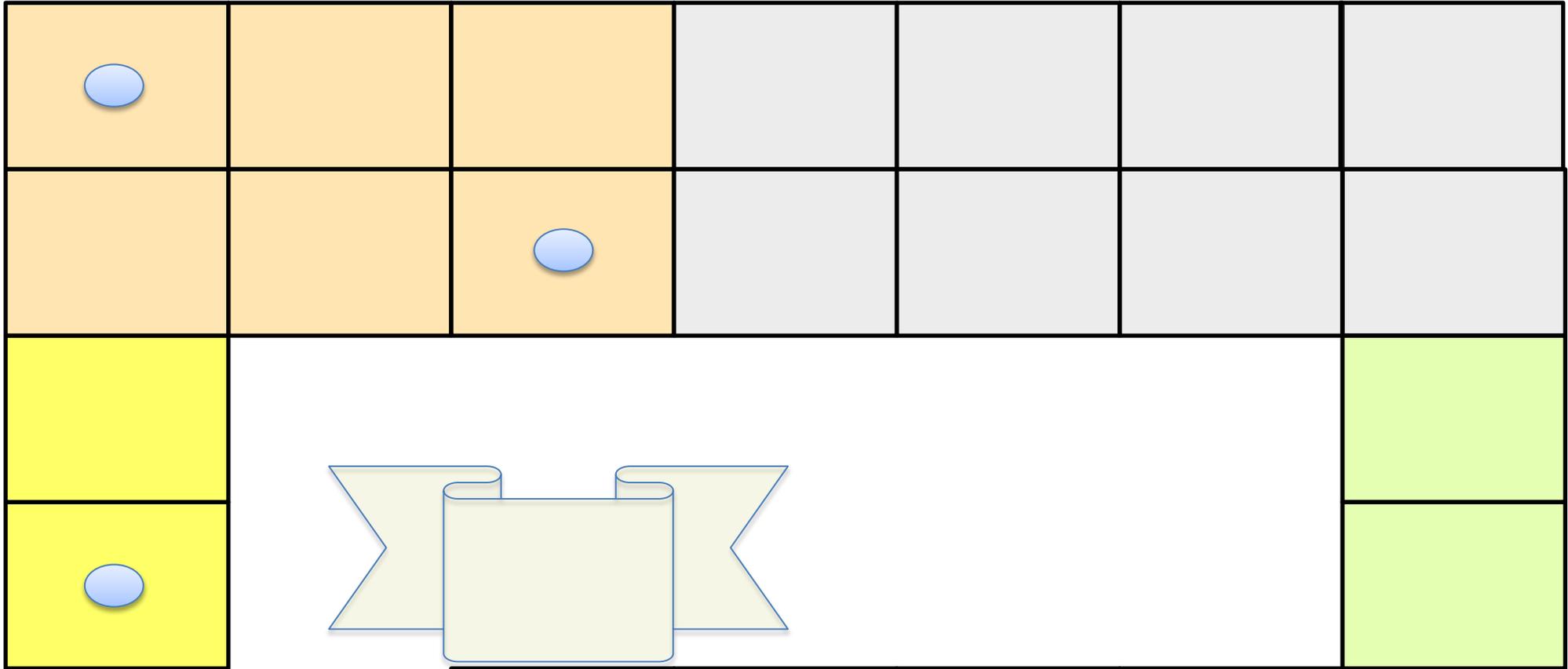
Hour 3



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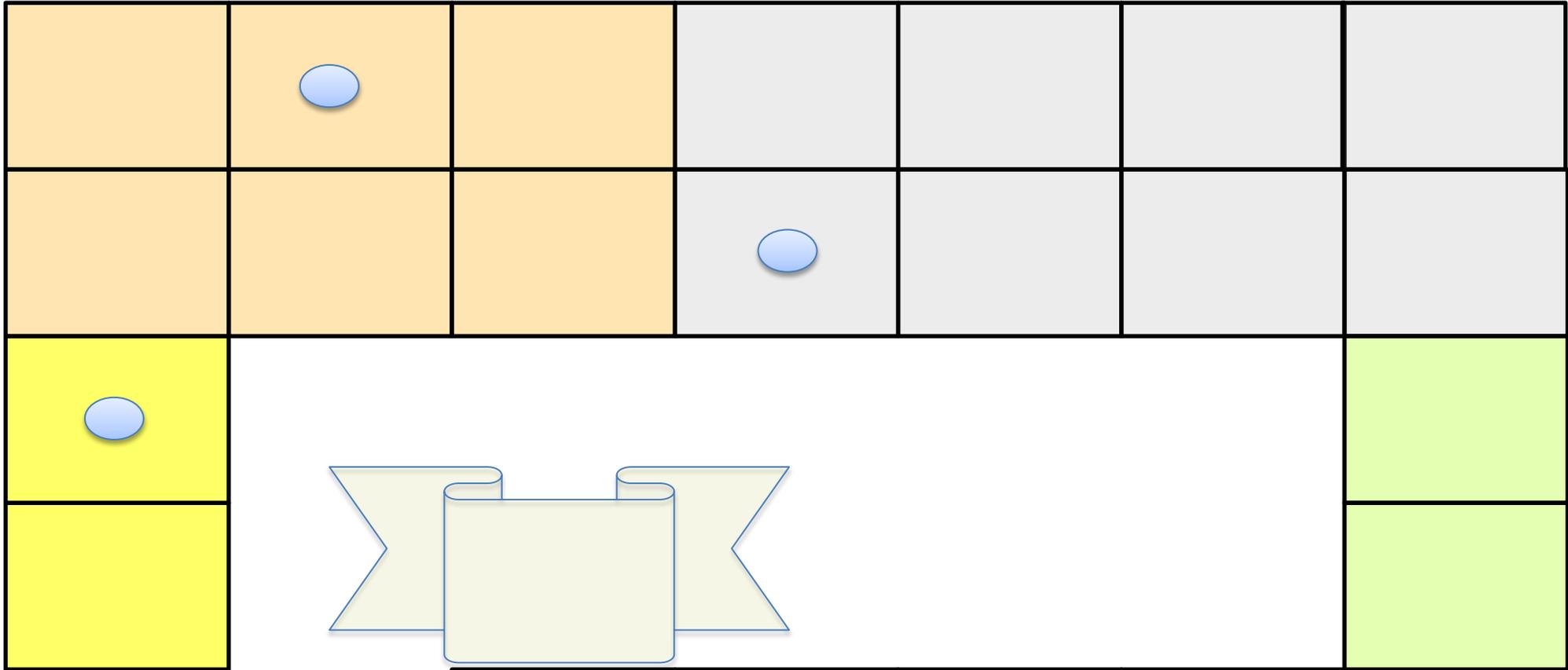


Hour 4

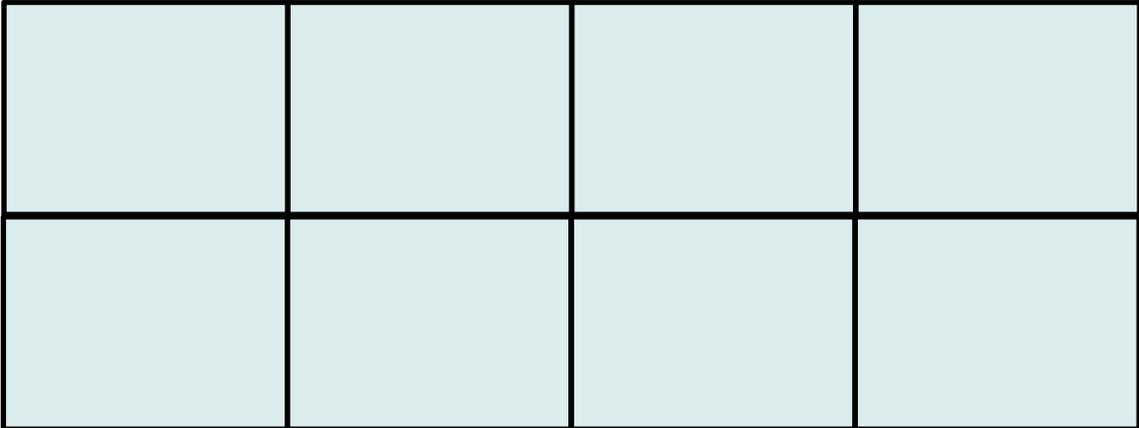


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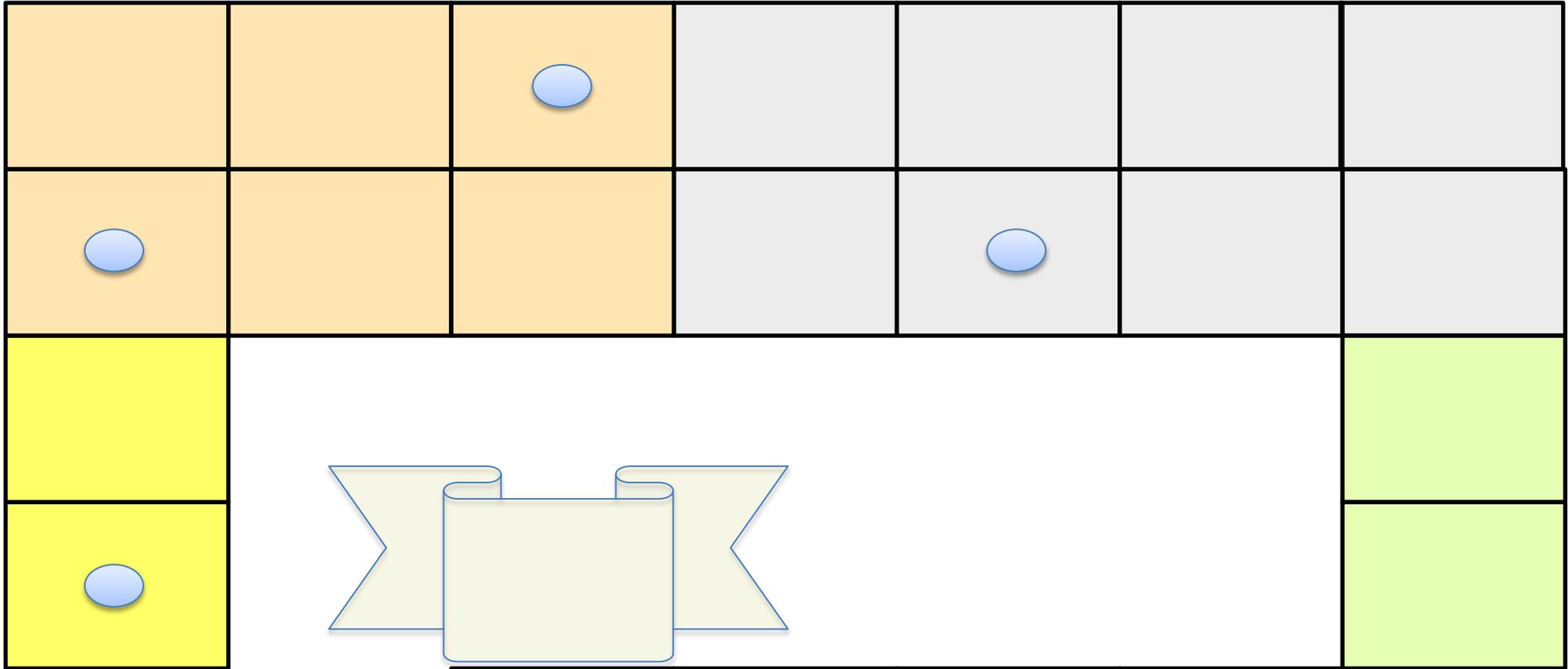
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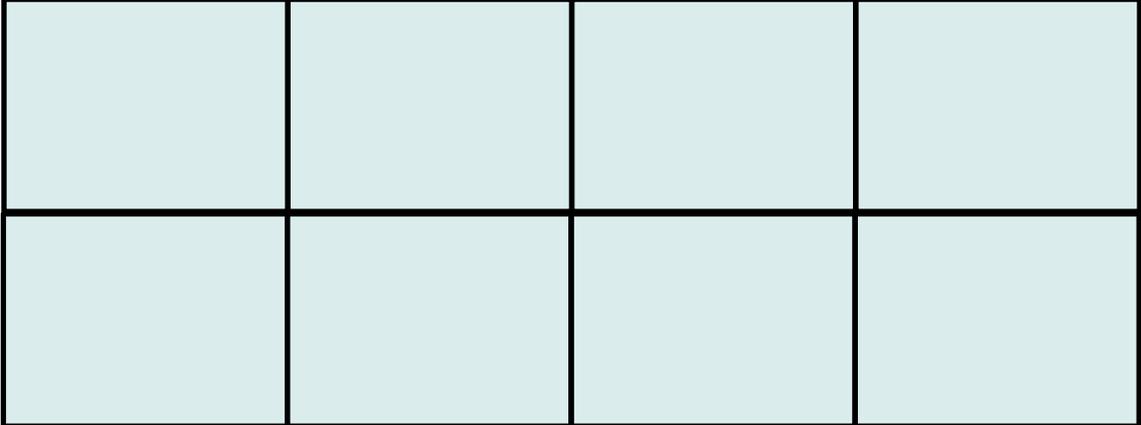
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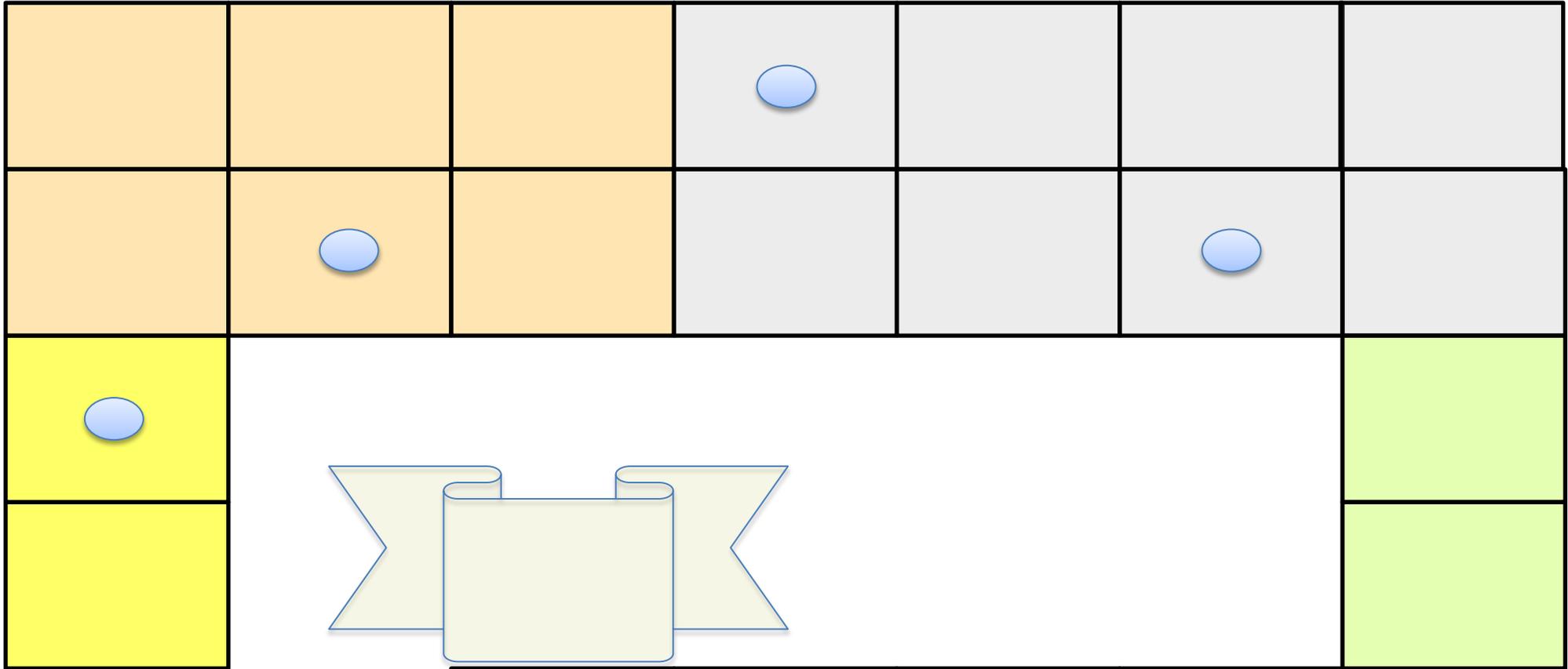
Hour 6



Queue

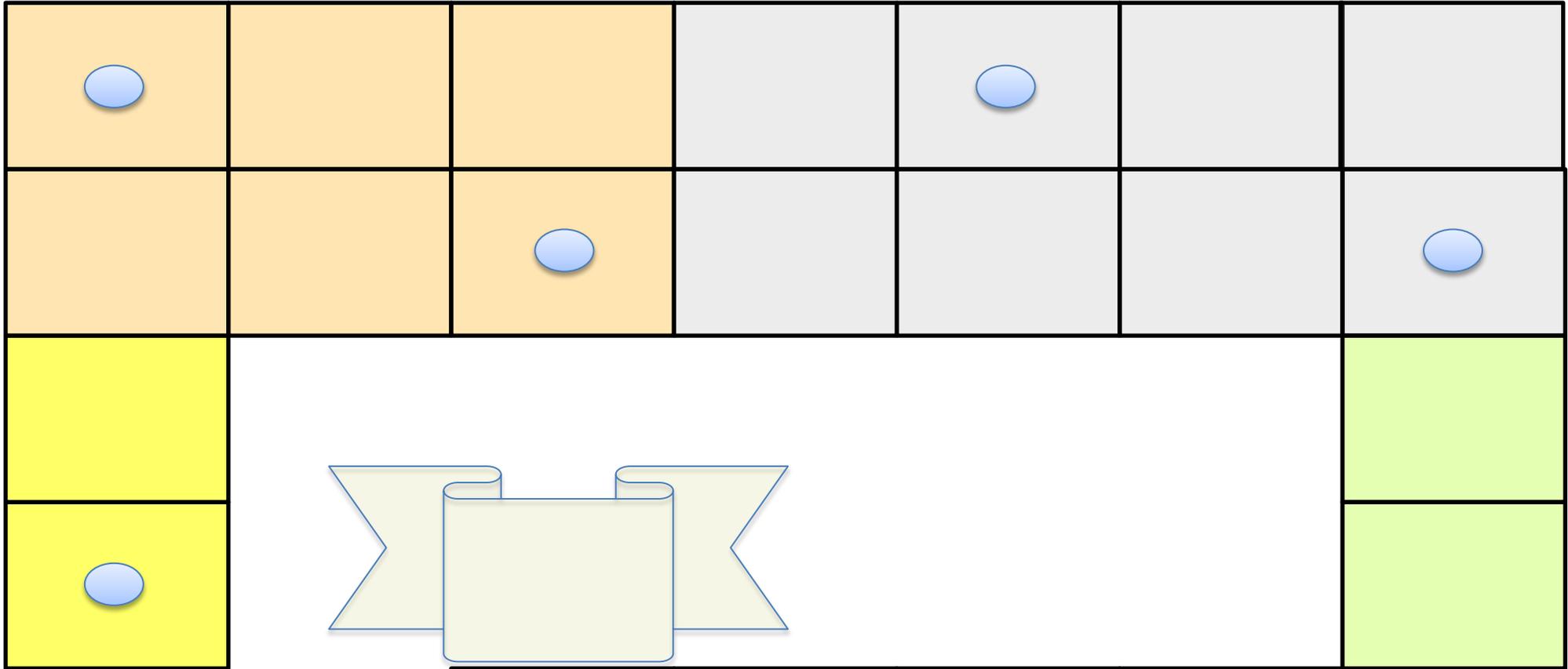


Hour 7

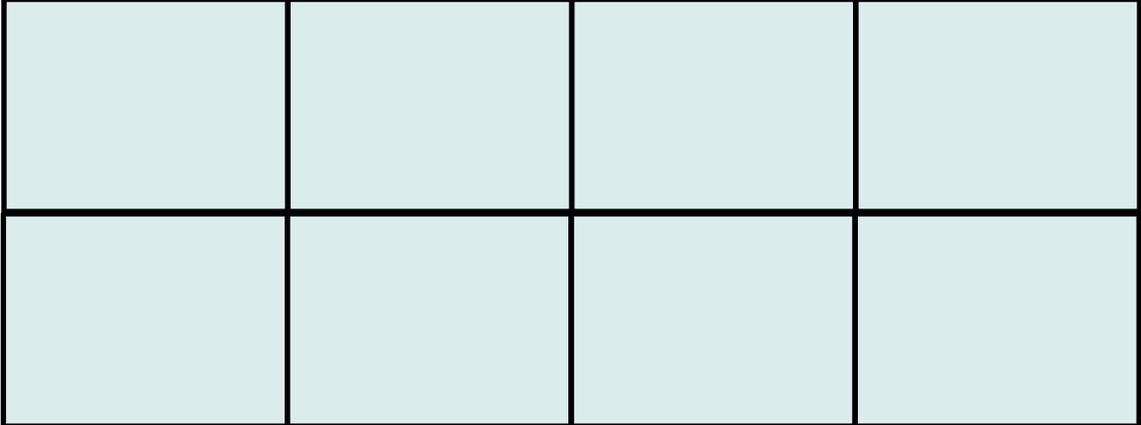


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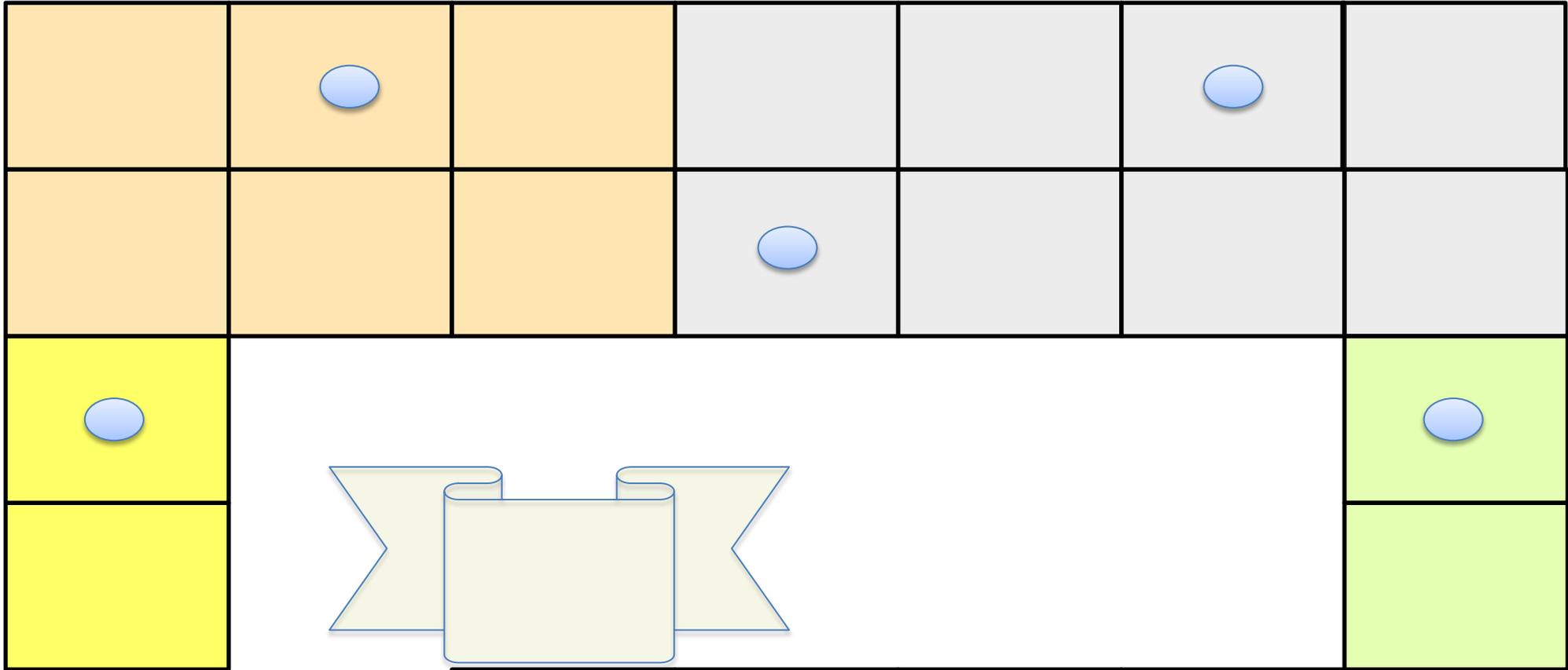
Hour 8



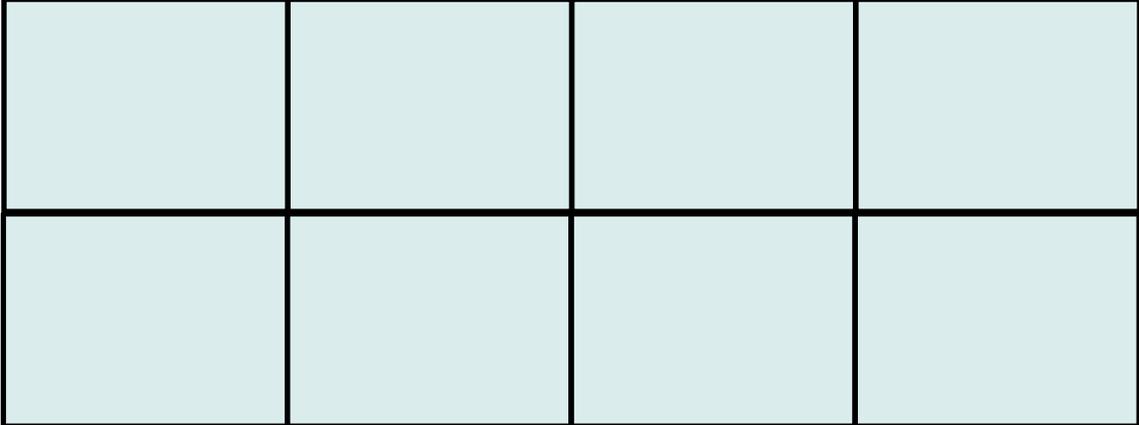
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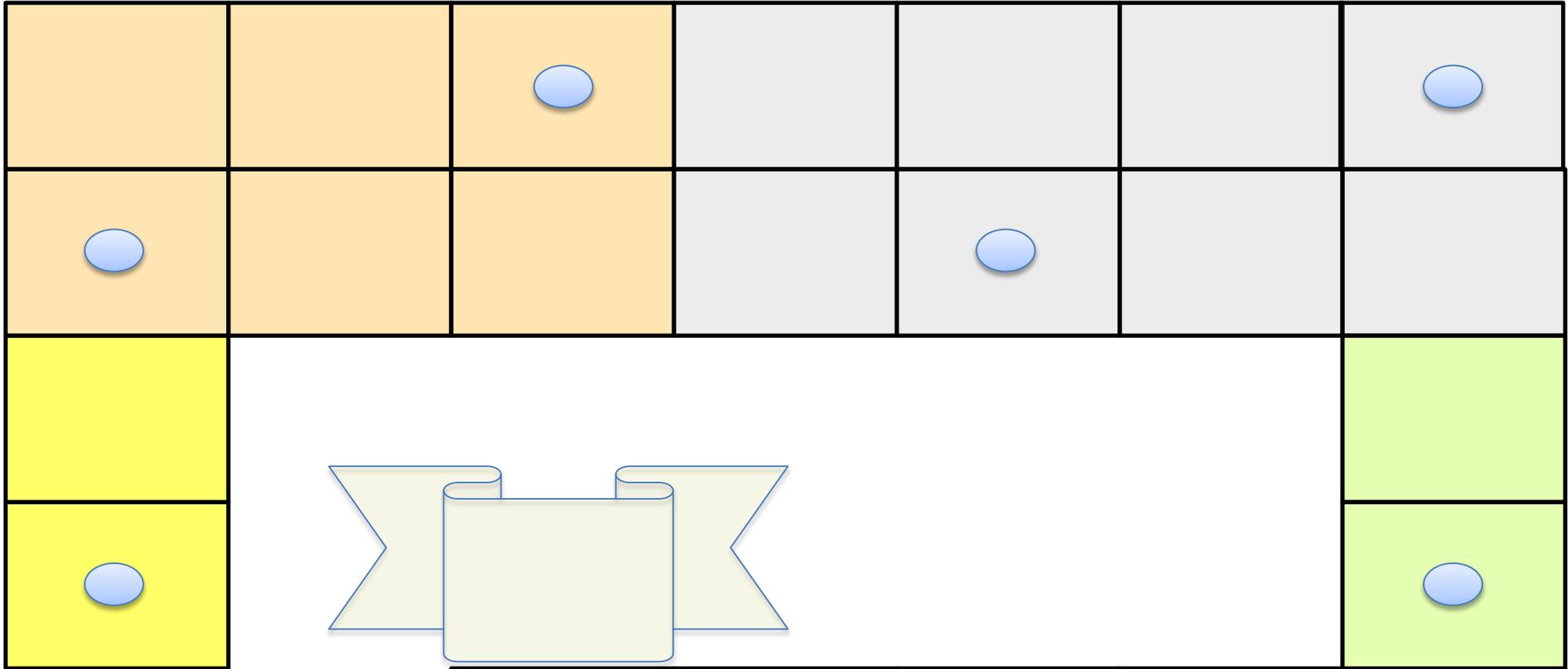
Hour 9



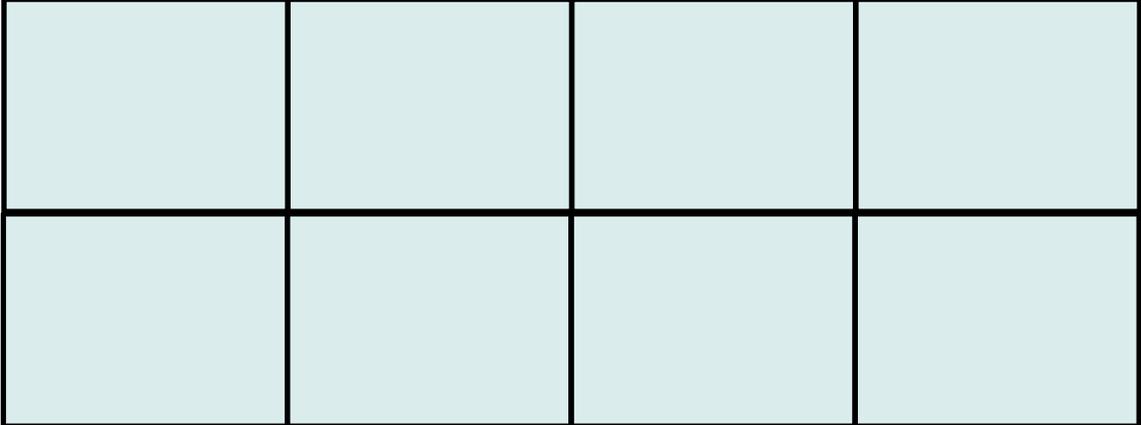
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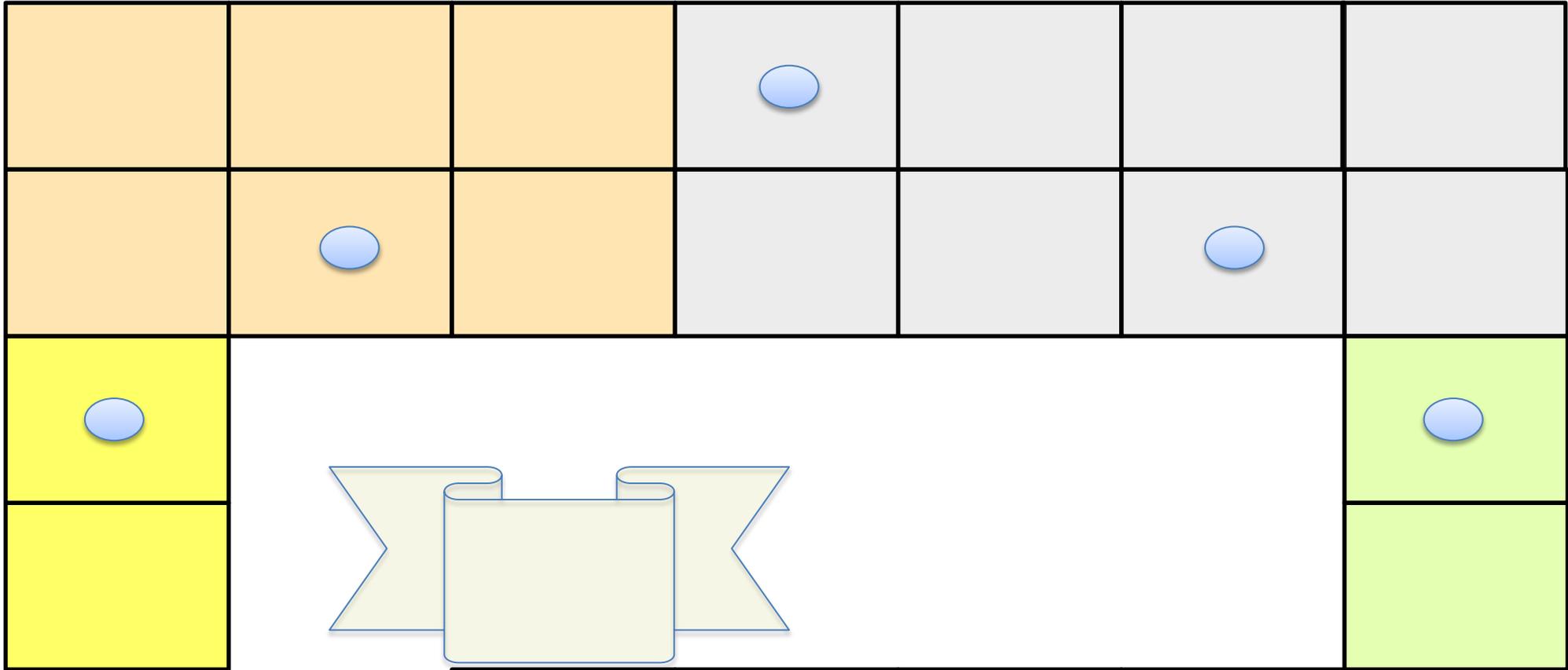


Hour 10

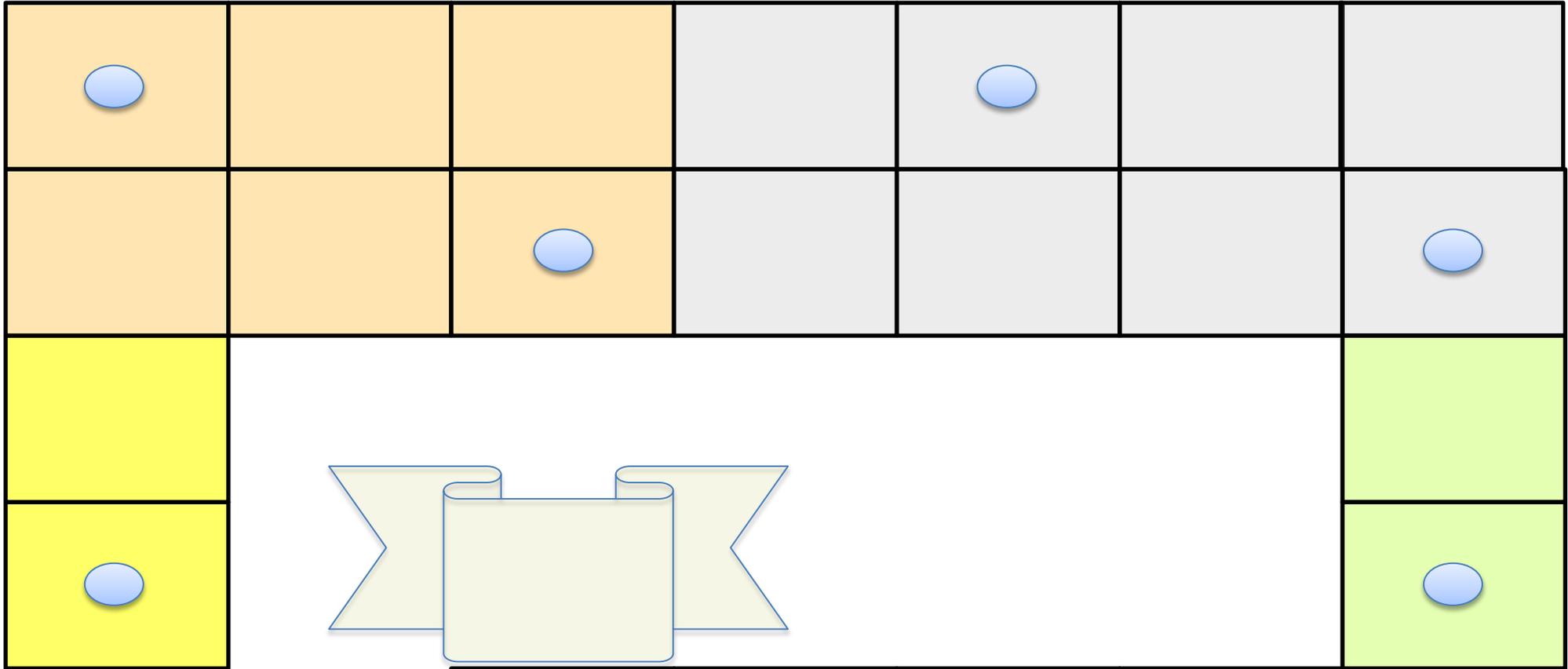


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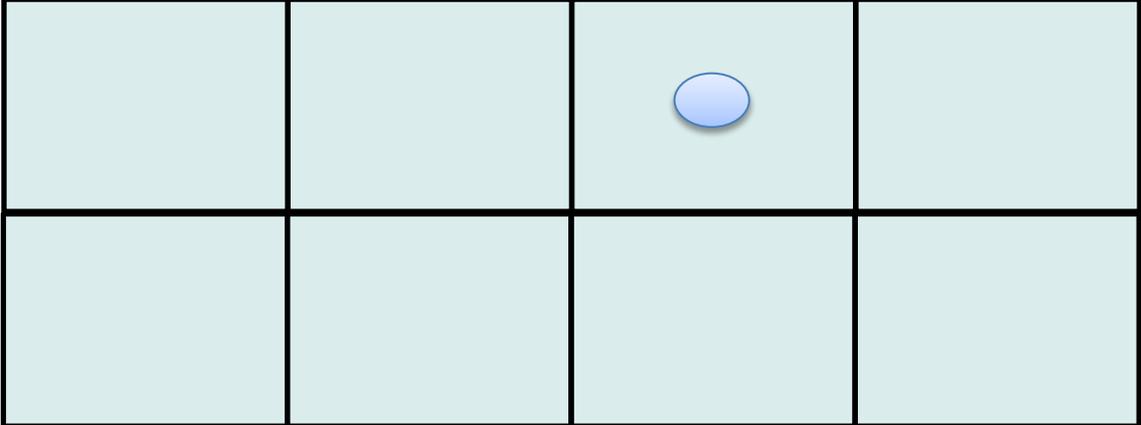


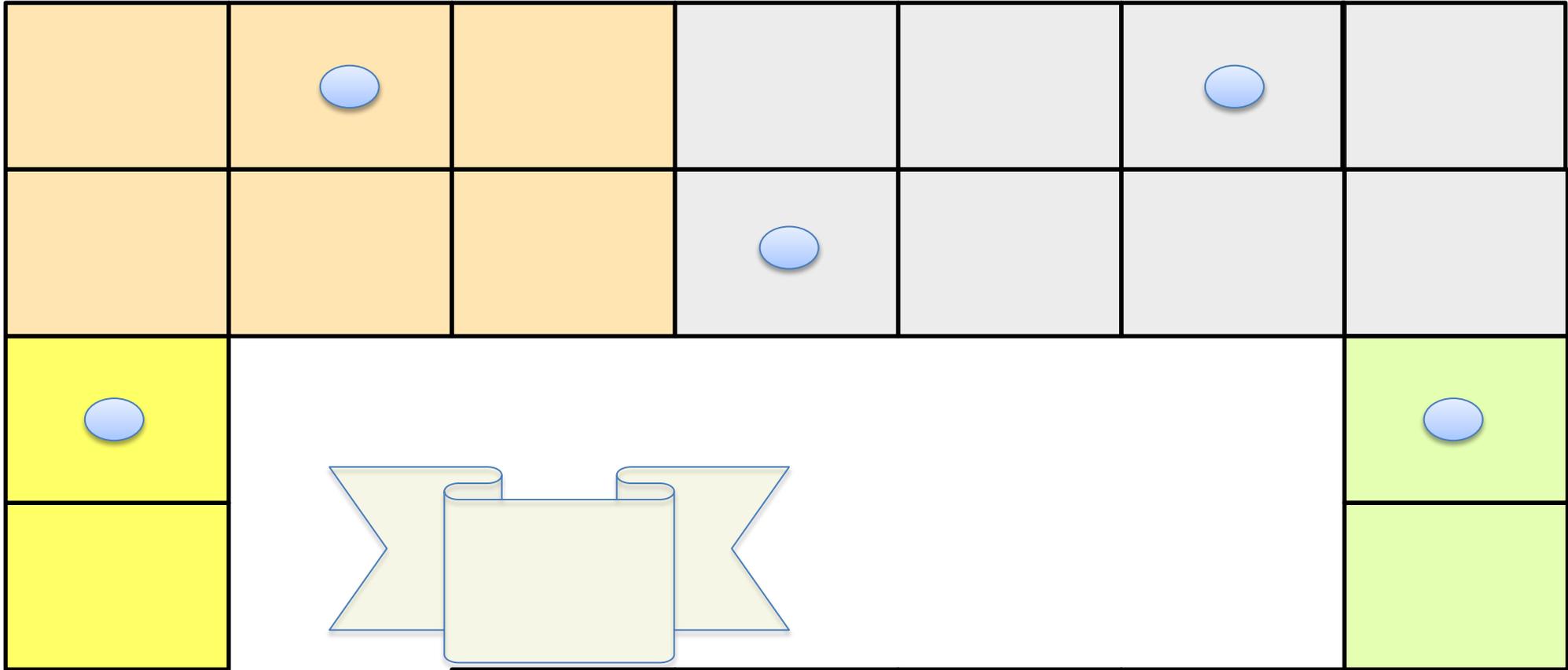


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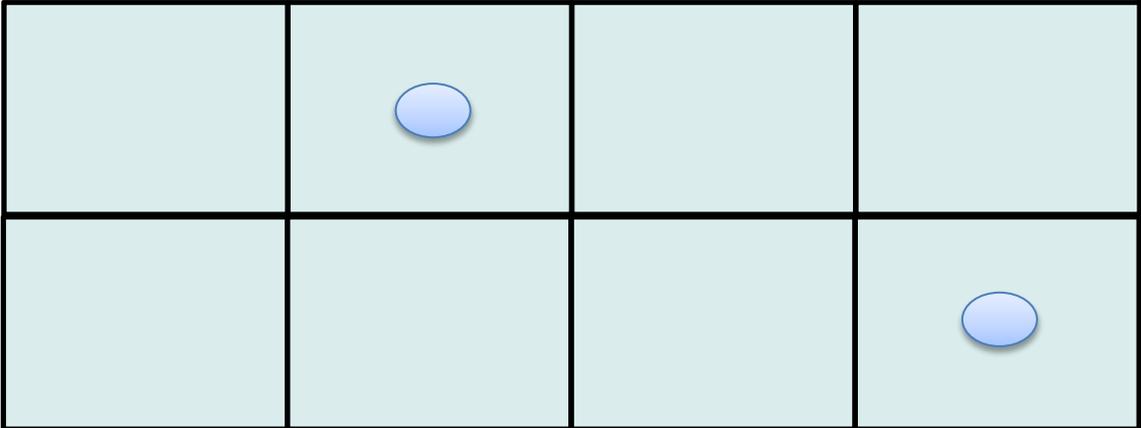


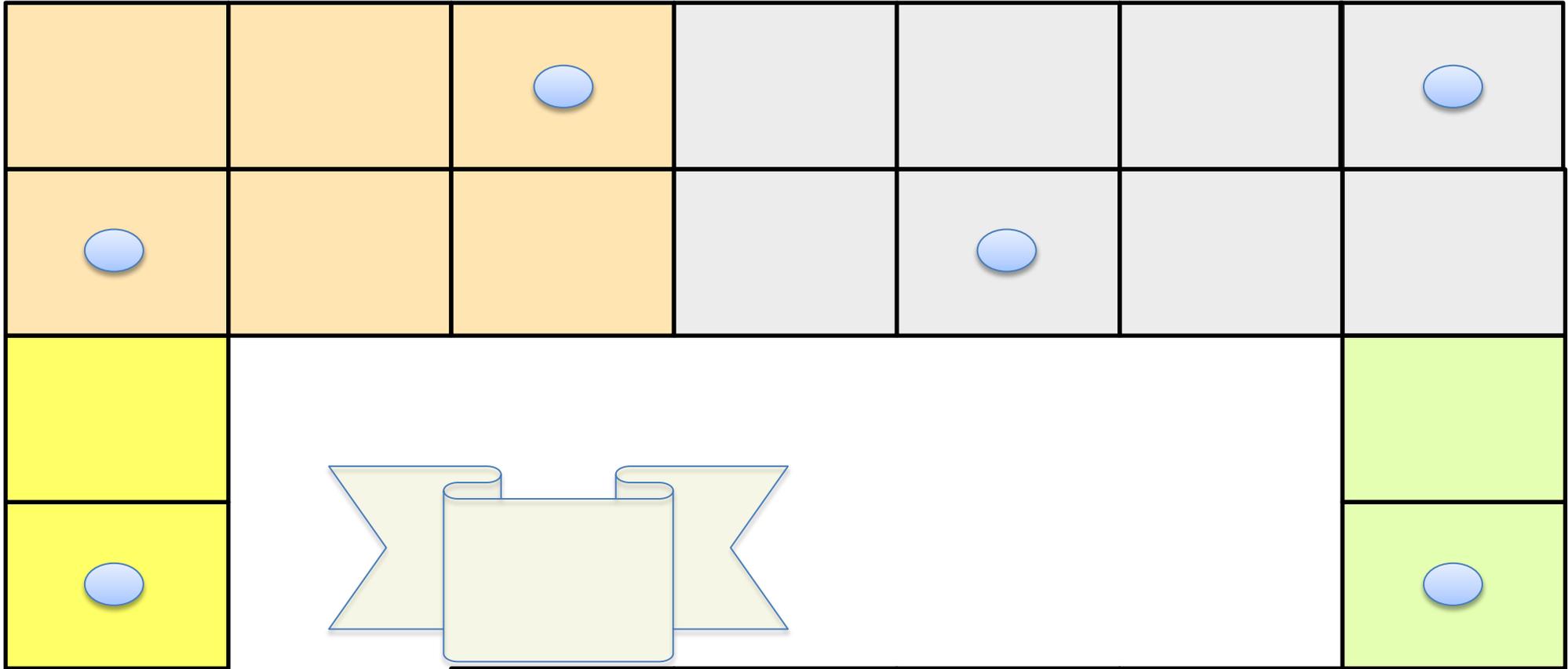
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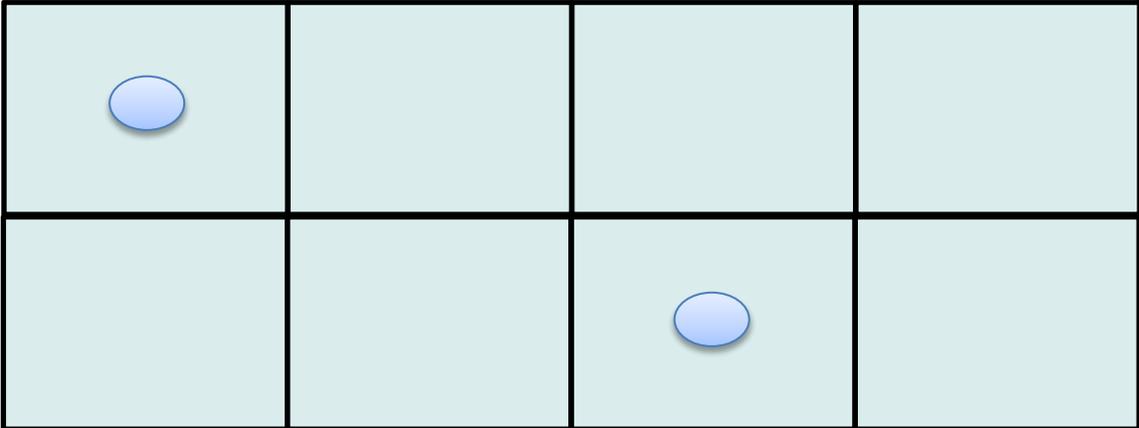


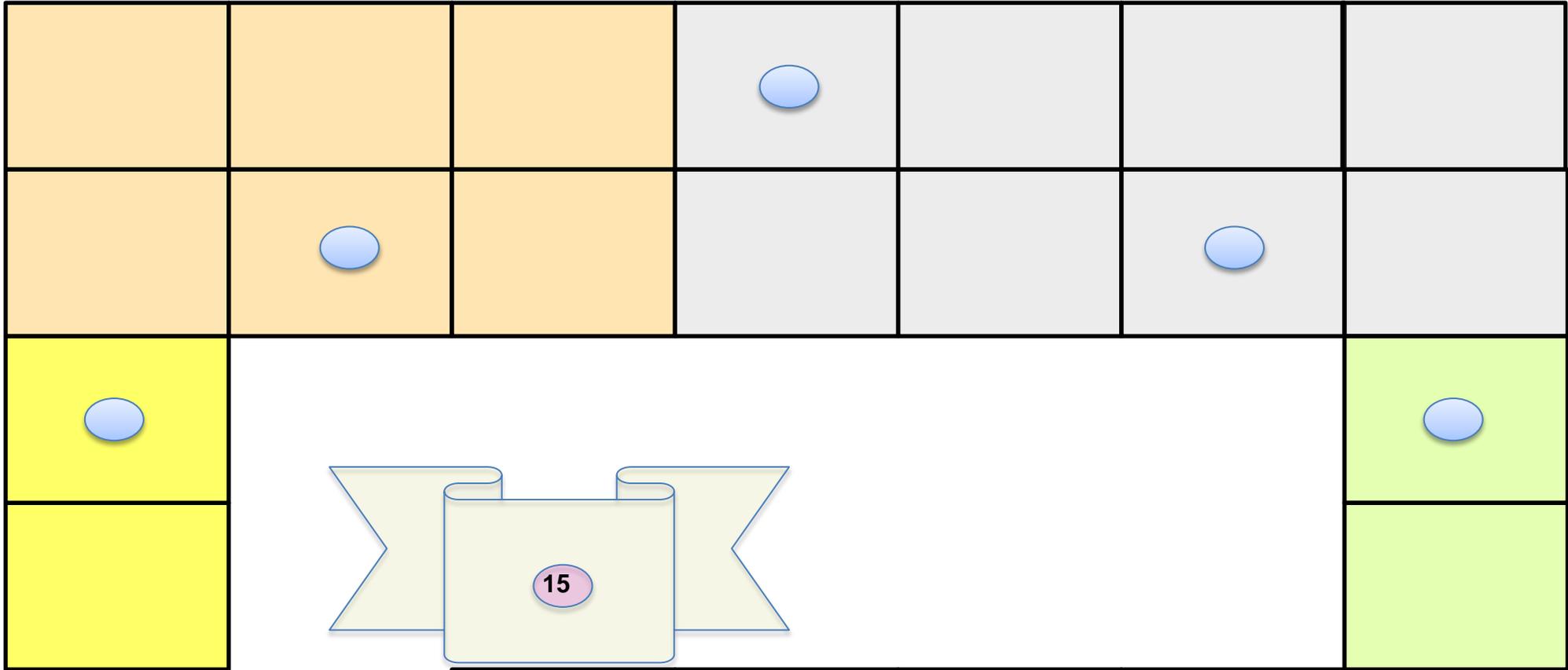
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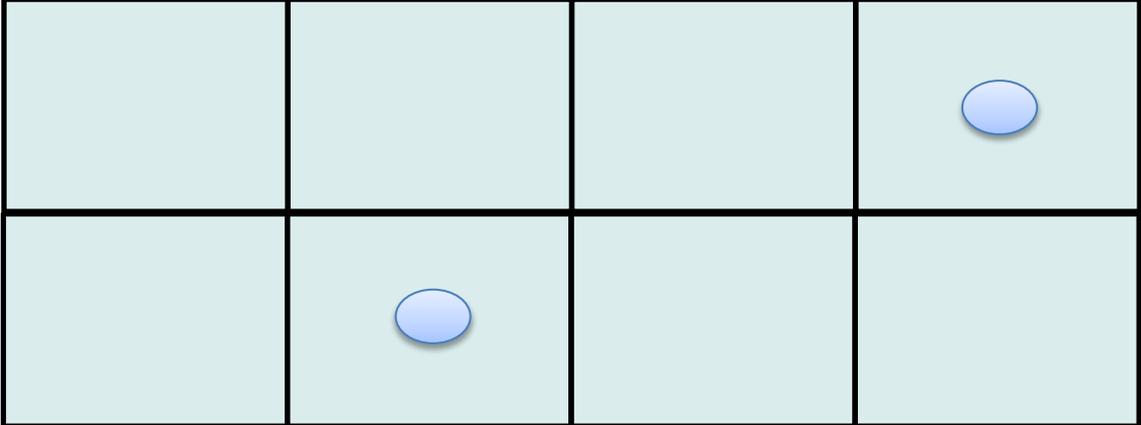


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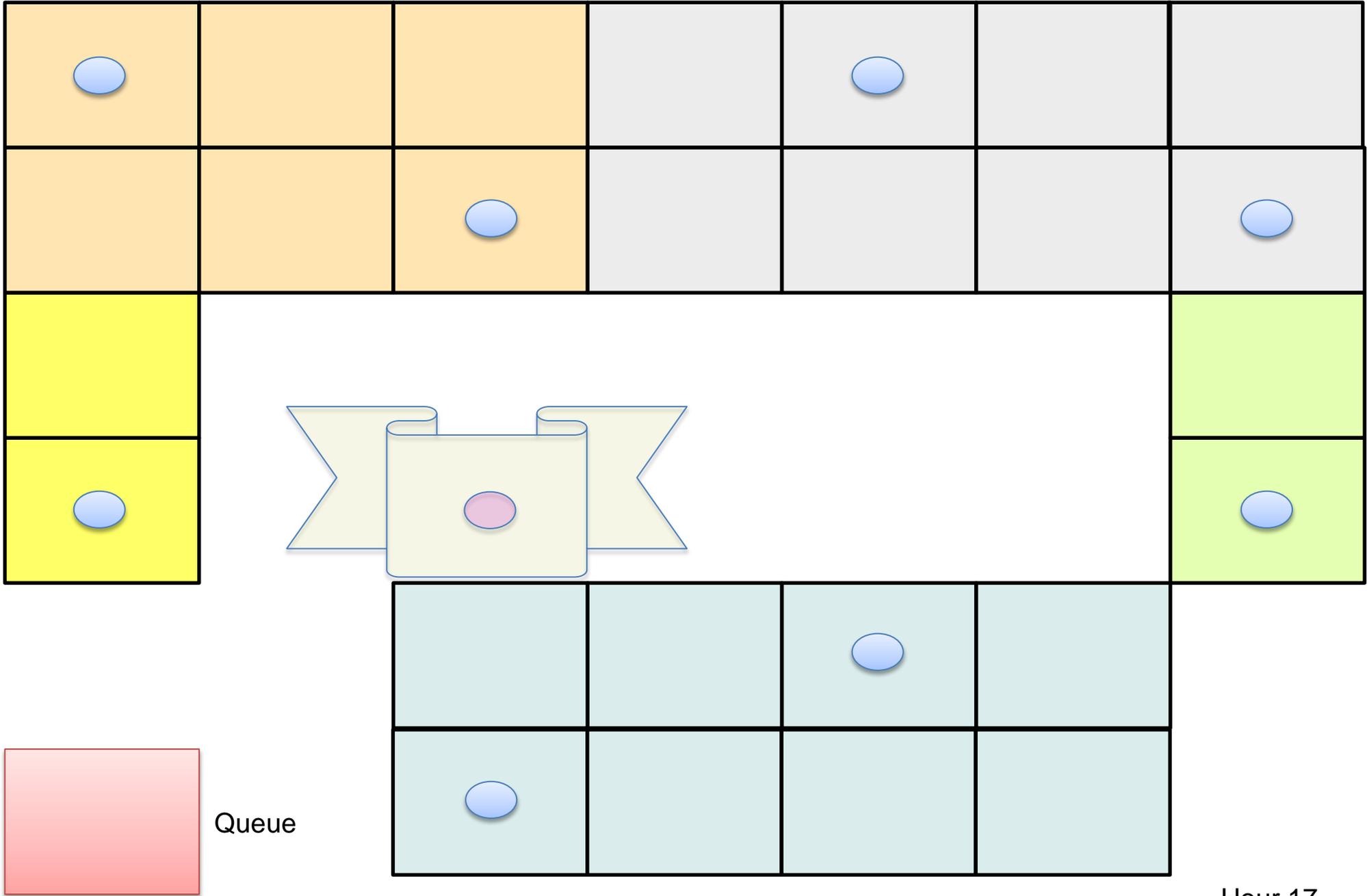




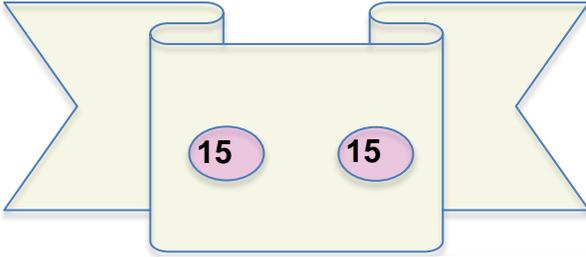
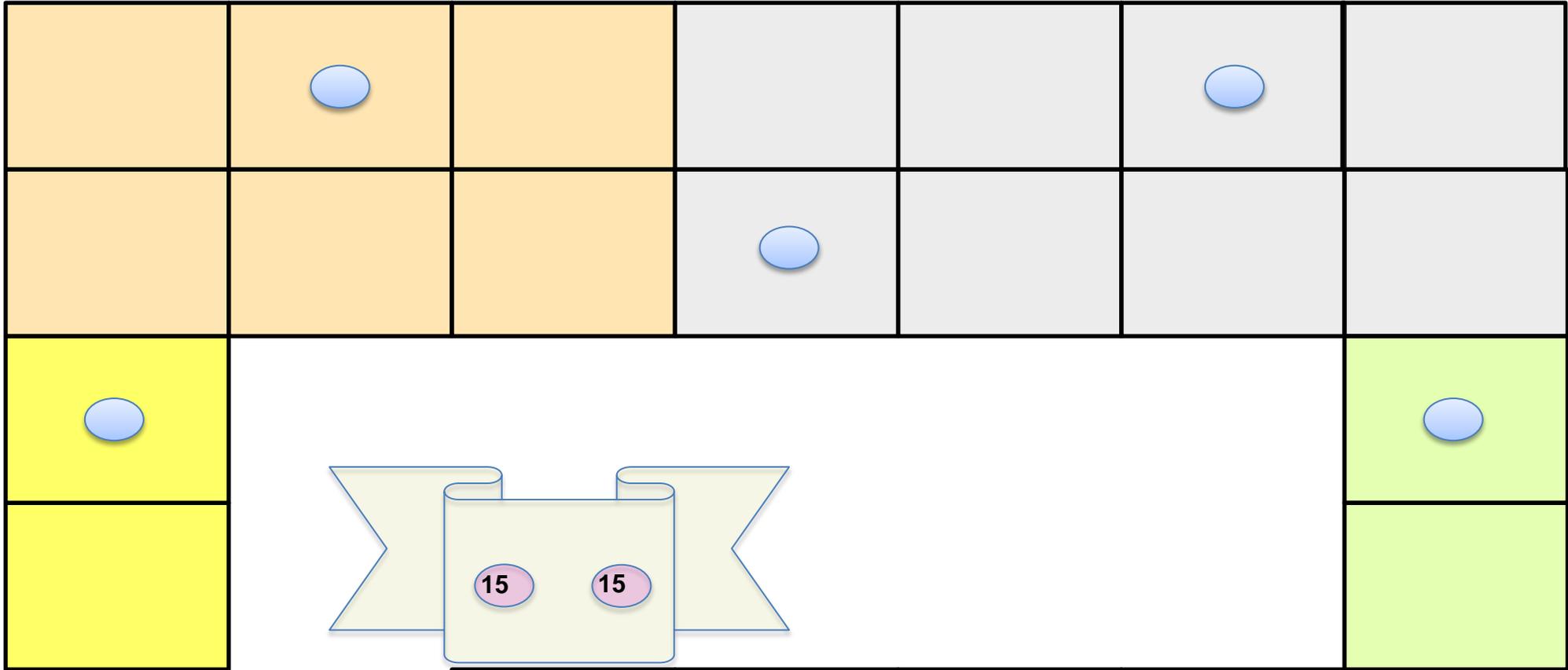
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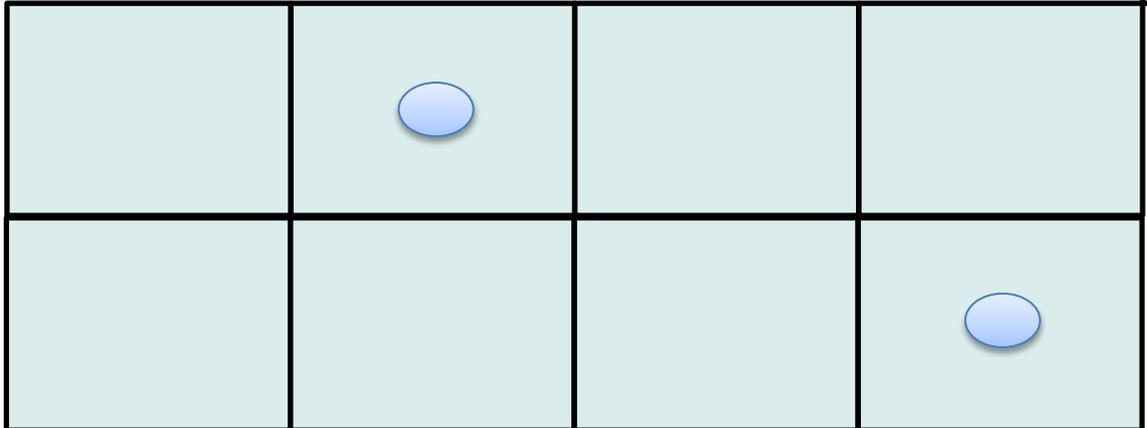
Hour 16



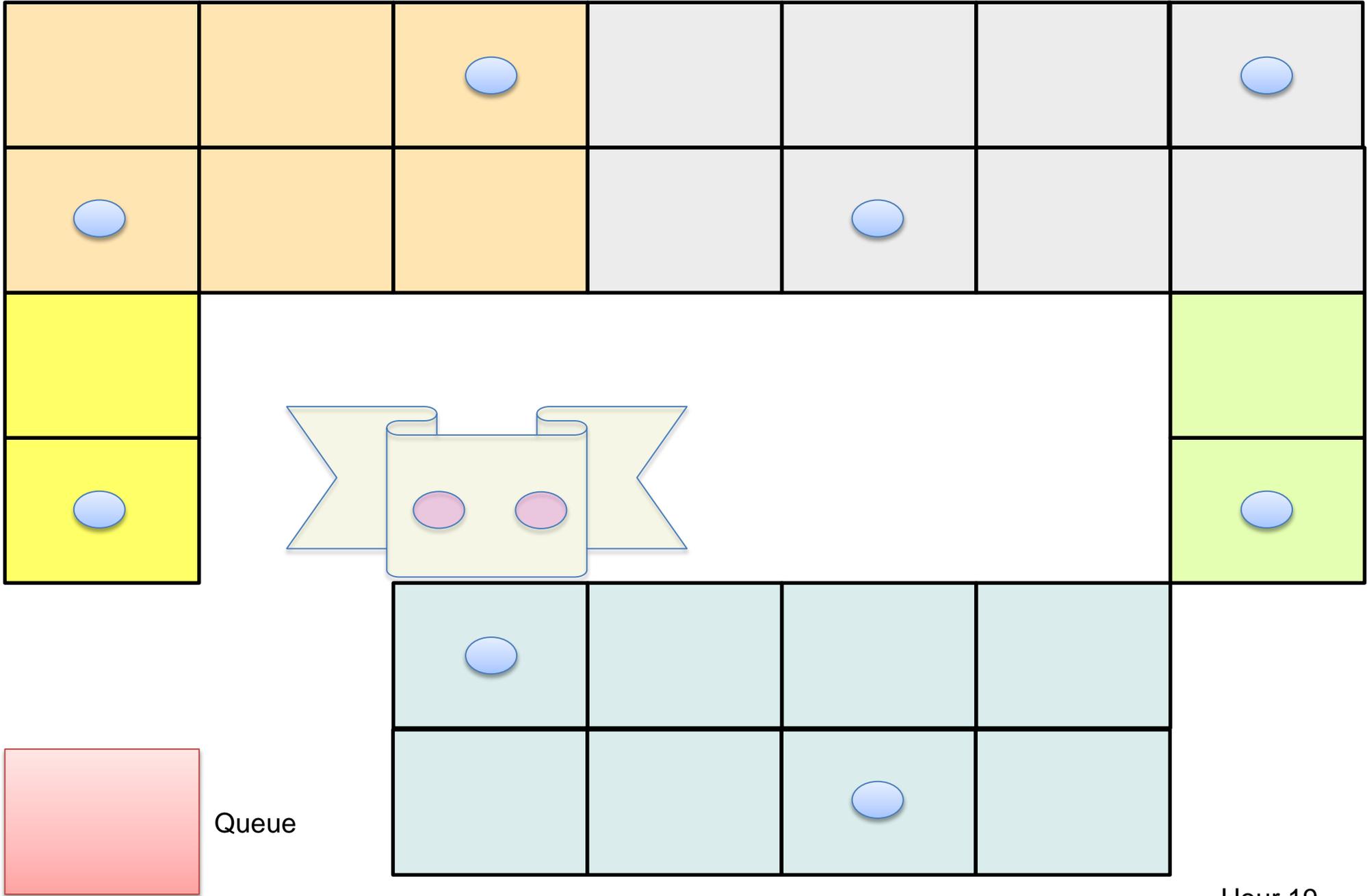
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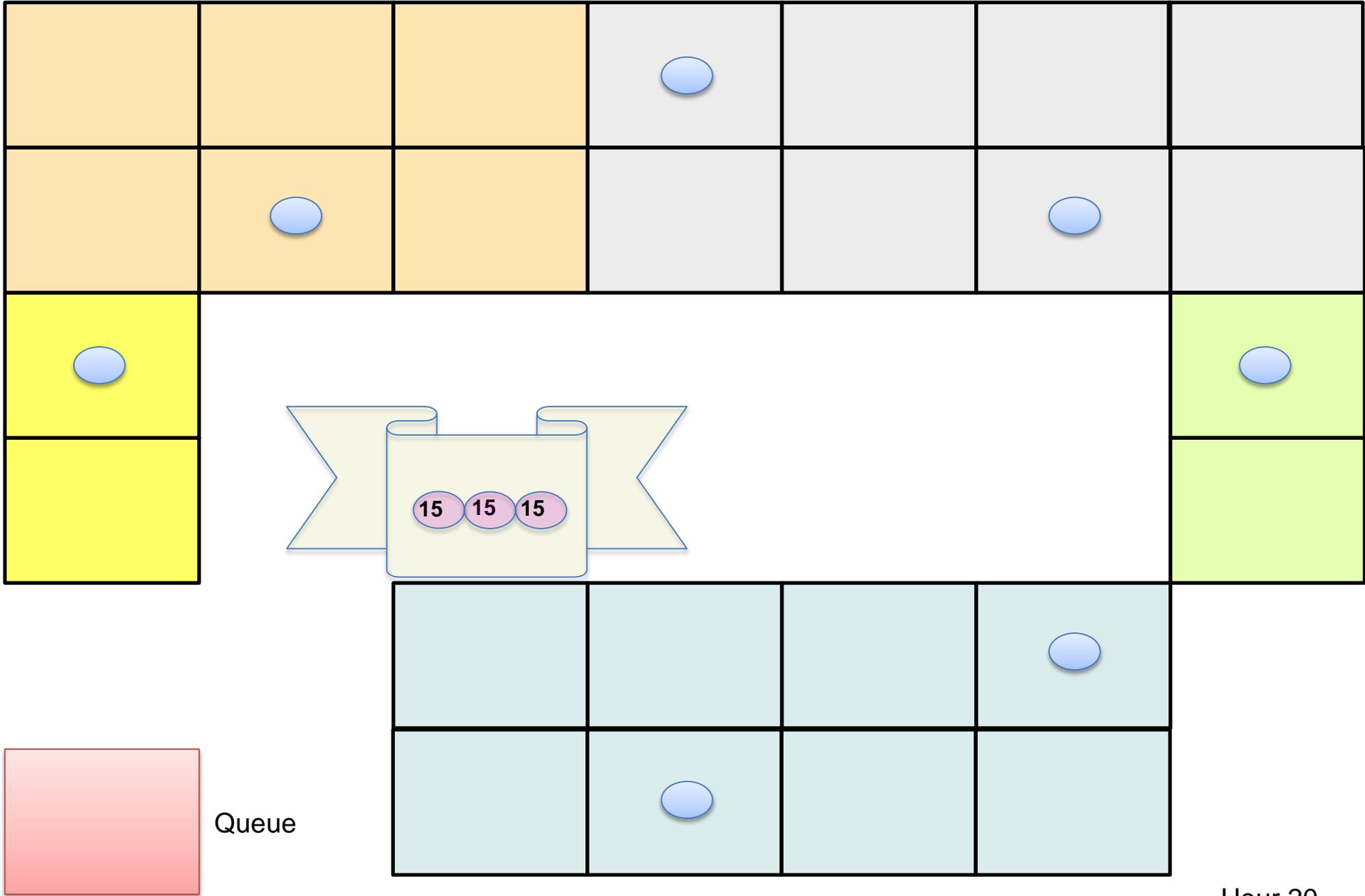


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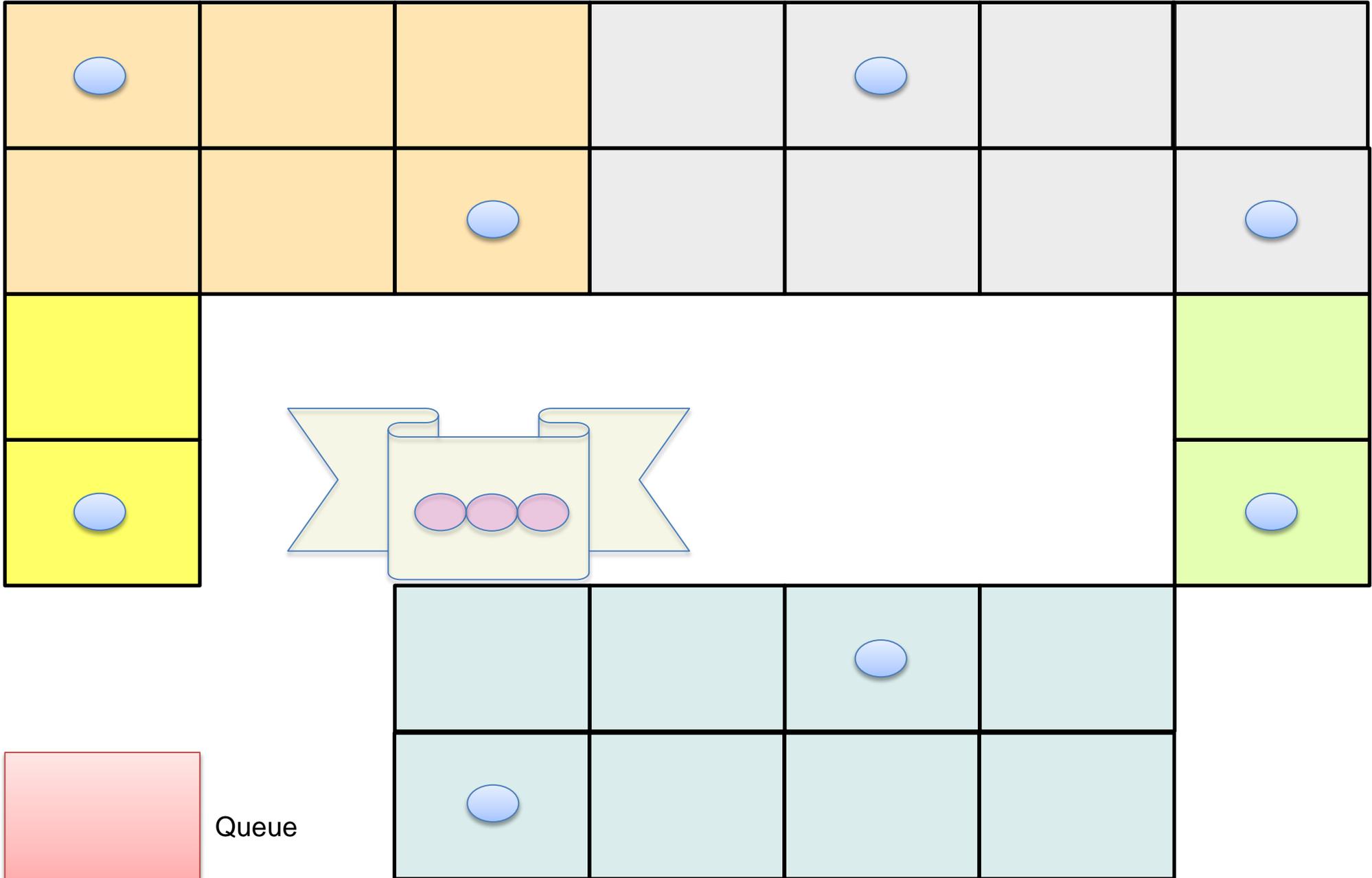


Hour 18

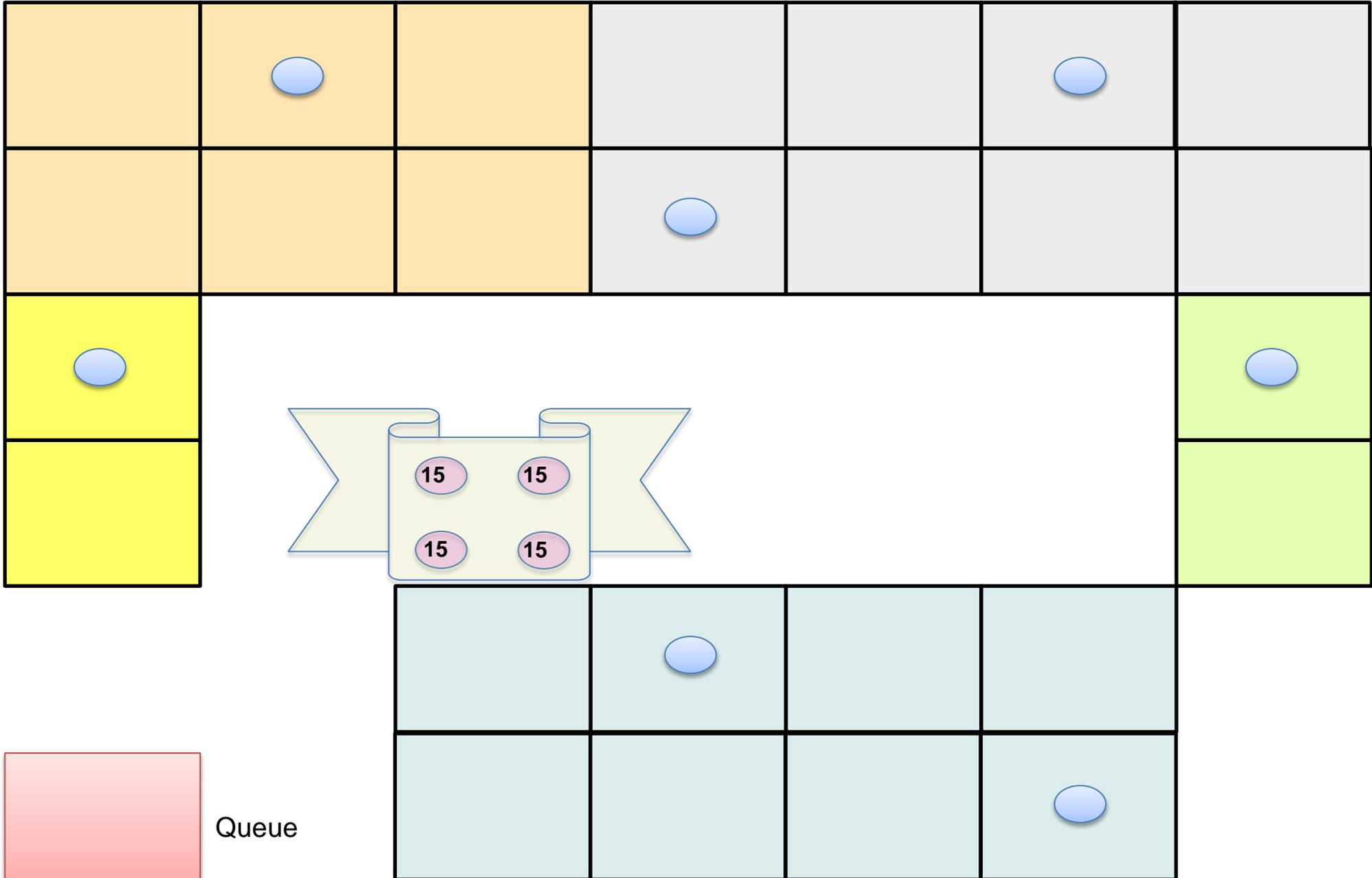




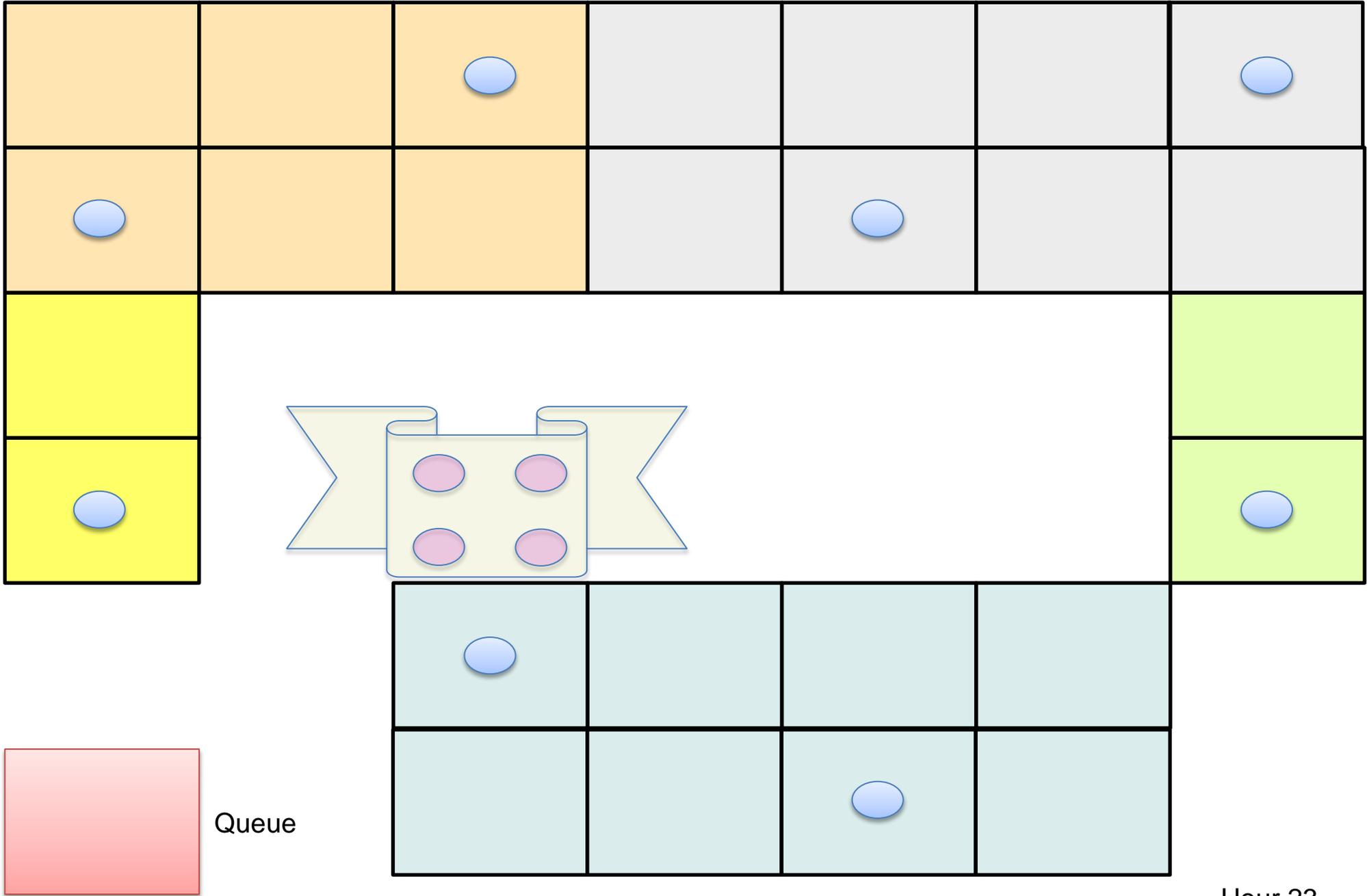
Hour 20



Queue

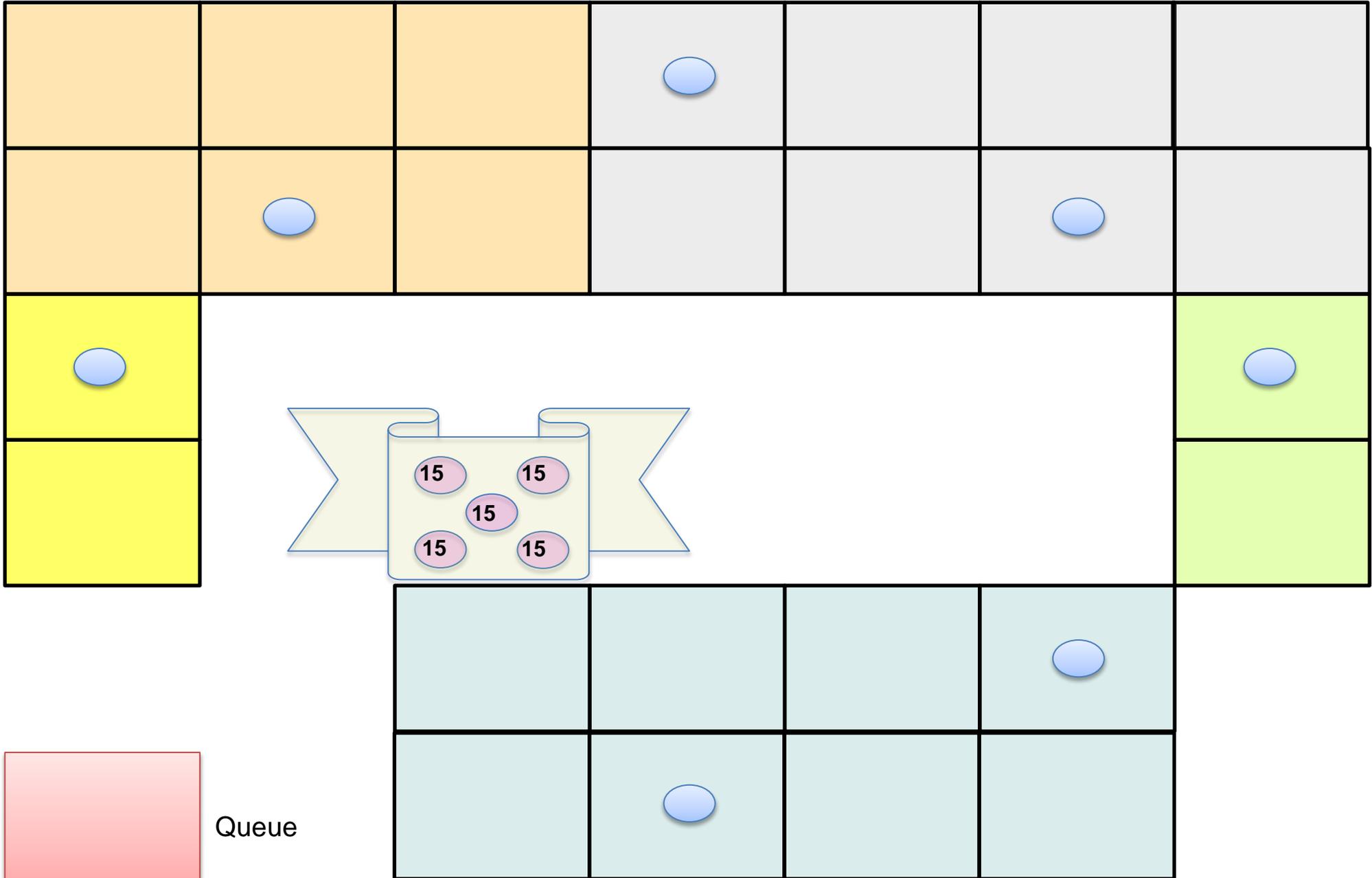


Queue



Queue

Hour 23



Queue

John Little's Law

- $WIP = \text{Throughput Rate (TR)} \times \text{Lead Time (LT)}$
- In the third example:
 - TR = 4 units per day (1 unit every 2 hours)
 - LT = 1.875 days (1 unit every 15 hours)
 - $4 \times 1.875 = 7.5$
- Optimal WIP is 7.5 units

WIP and Costs per Unit

- In the third example:
 - Fixed costs are for operating expenses based on 8 FTE's
 - The hourly rate is \$60 (includes overhead)
 - Therefore, total fixed costs per week are \$19,200
 - The throughput rate is one unit every two hours or 20 units per week (40 / 2)
 - The cost per unit is \$960 ($\$19,200 / 20$)

Reducing WIP: Practical Applications

- Less WIP enables:
 - Less multitasking
 - More blue-light (critical activities)
 - Excess capacity to focus on/assist critical activities
 - Smarter flow of throughput
 - Faster processing

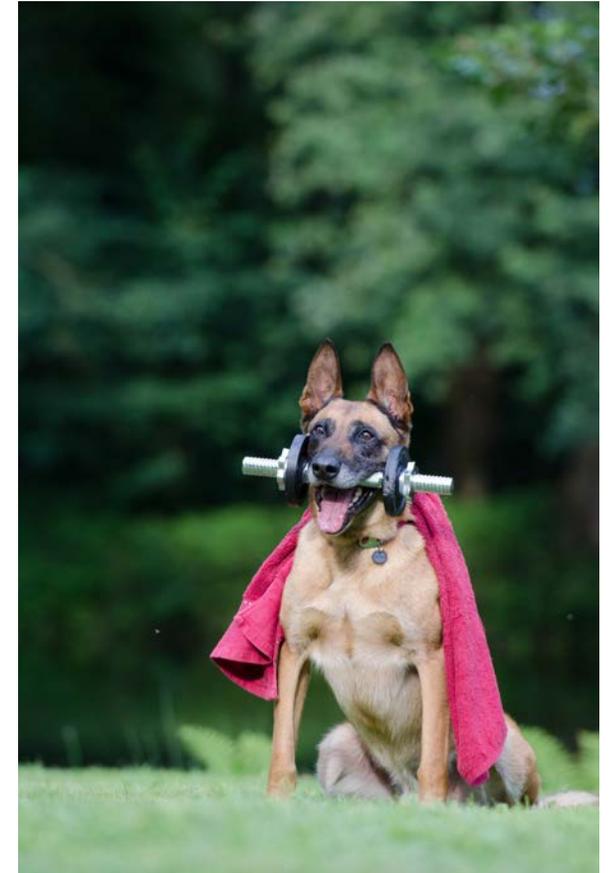


- **Less WIP enables:**
 - Less multitasking
 - **More blue-light (investigations)**
 - Excess capacity to focus on/assist critical activities
 - Smarter flow of throughput
 - Faster processing



The Challenge of Practical Application

- Concepts may apply differently in different systems
- Some things may make sense in one context that don't in another context

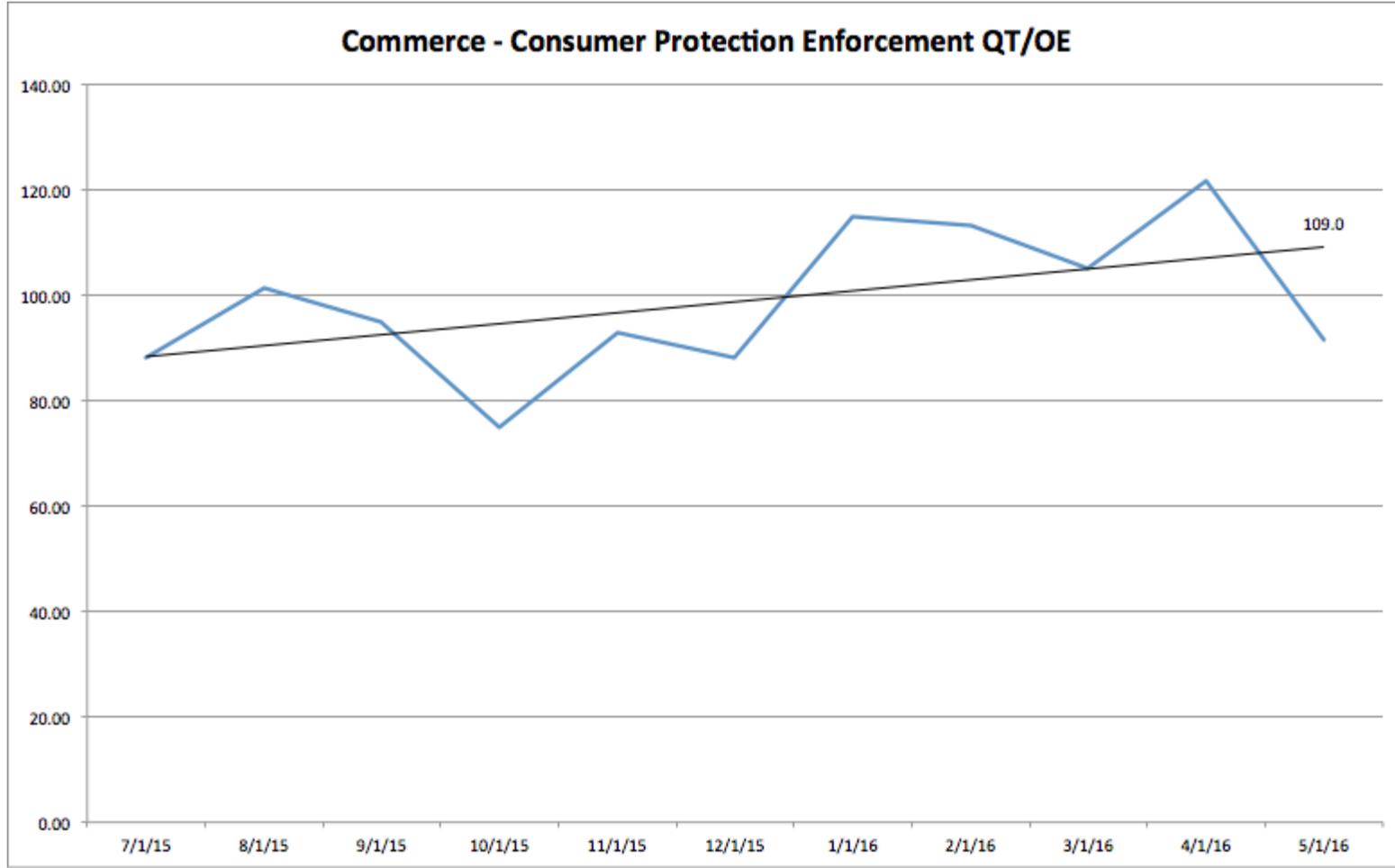


Ideas for Controlling WIP



- 1) Avoid having WIP on someone's desk when completion is outside the person's control
- 2) Controlling WIP is not just what enters the system, but what remains there
- 3) A person's WIP should be their blue-light activity





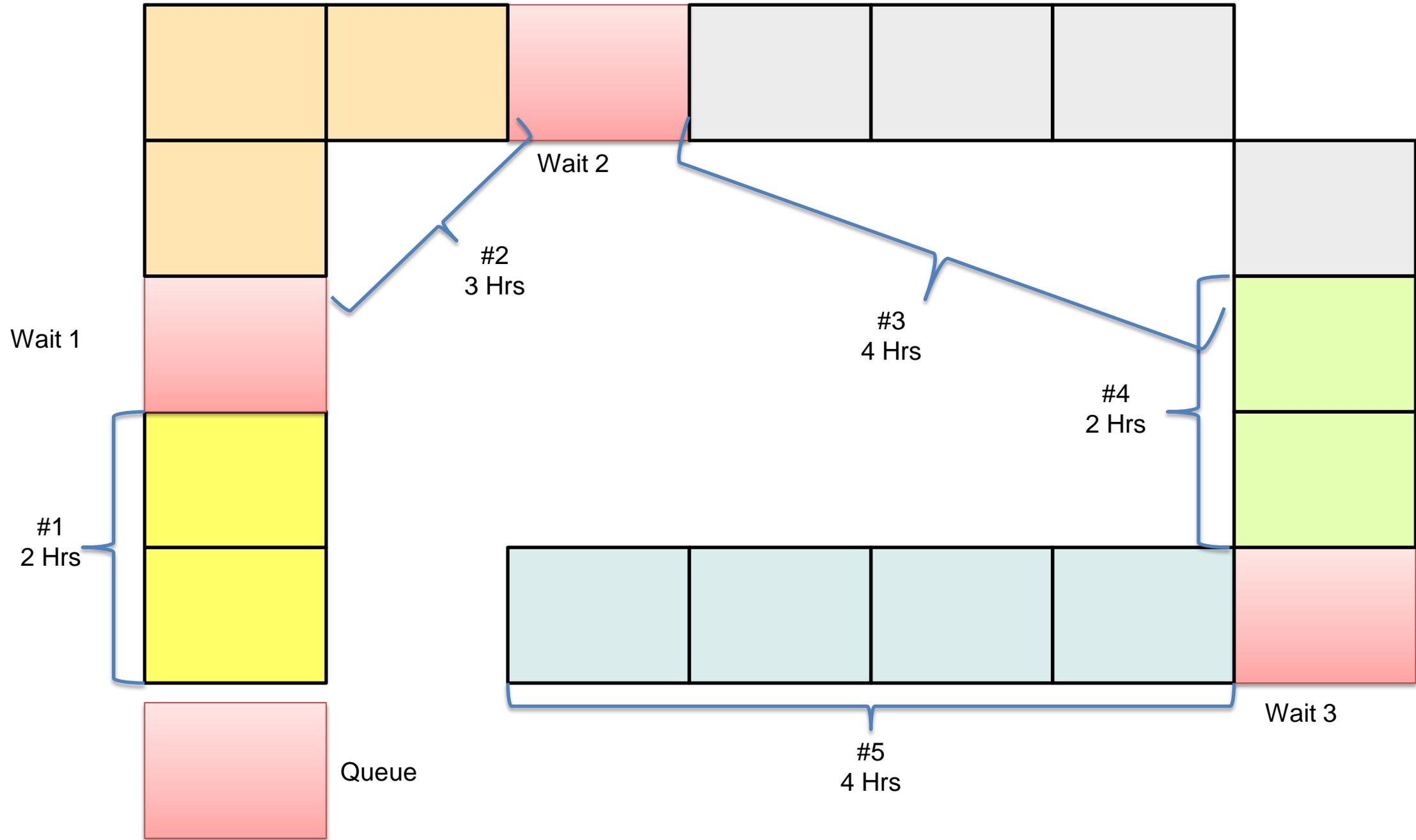
3 Illustrations from the Division of Consumer Protection's investigations team

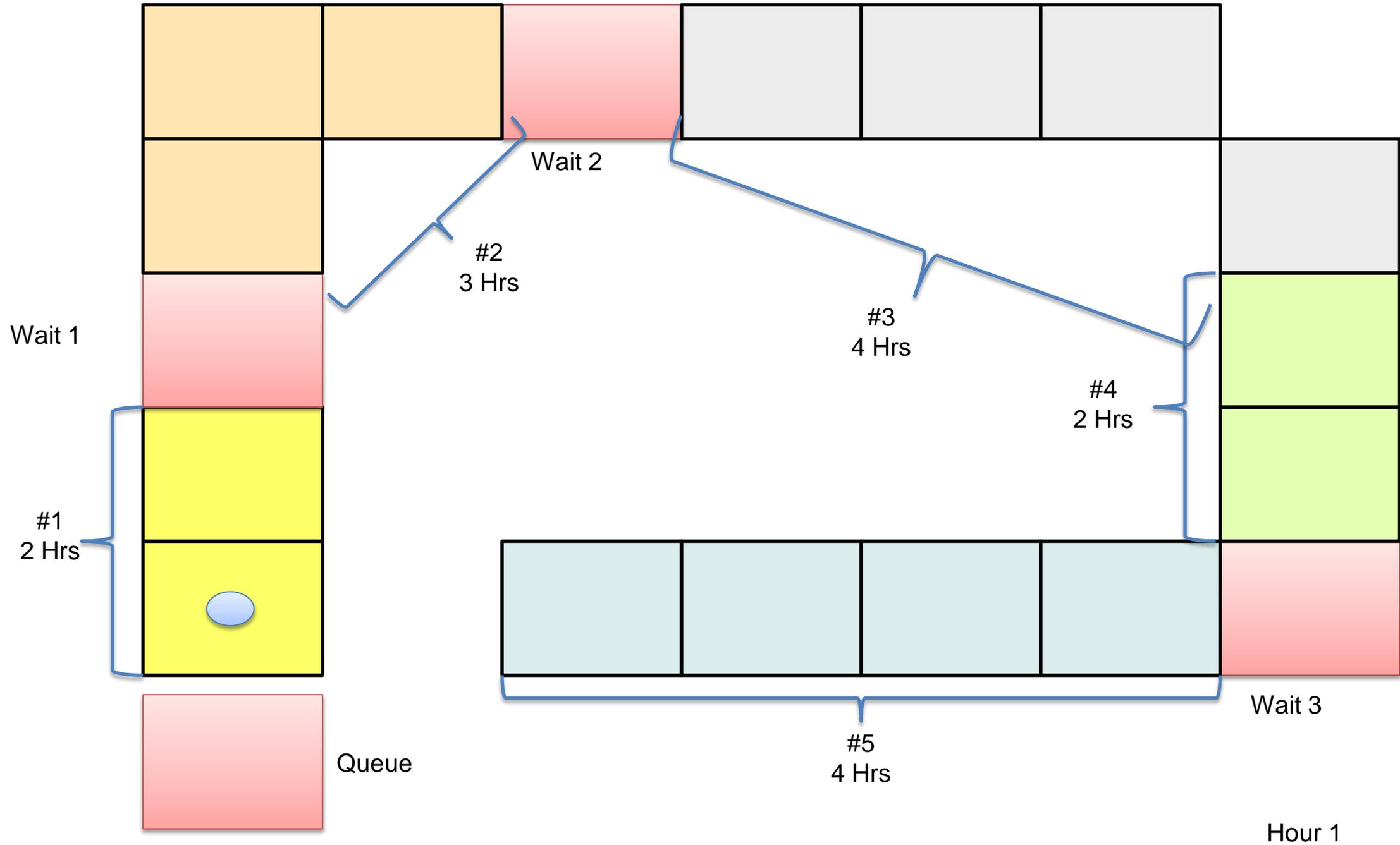


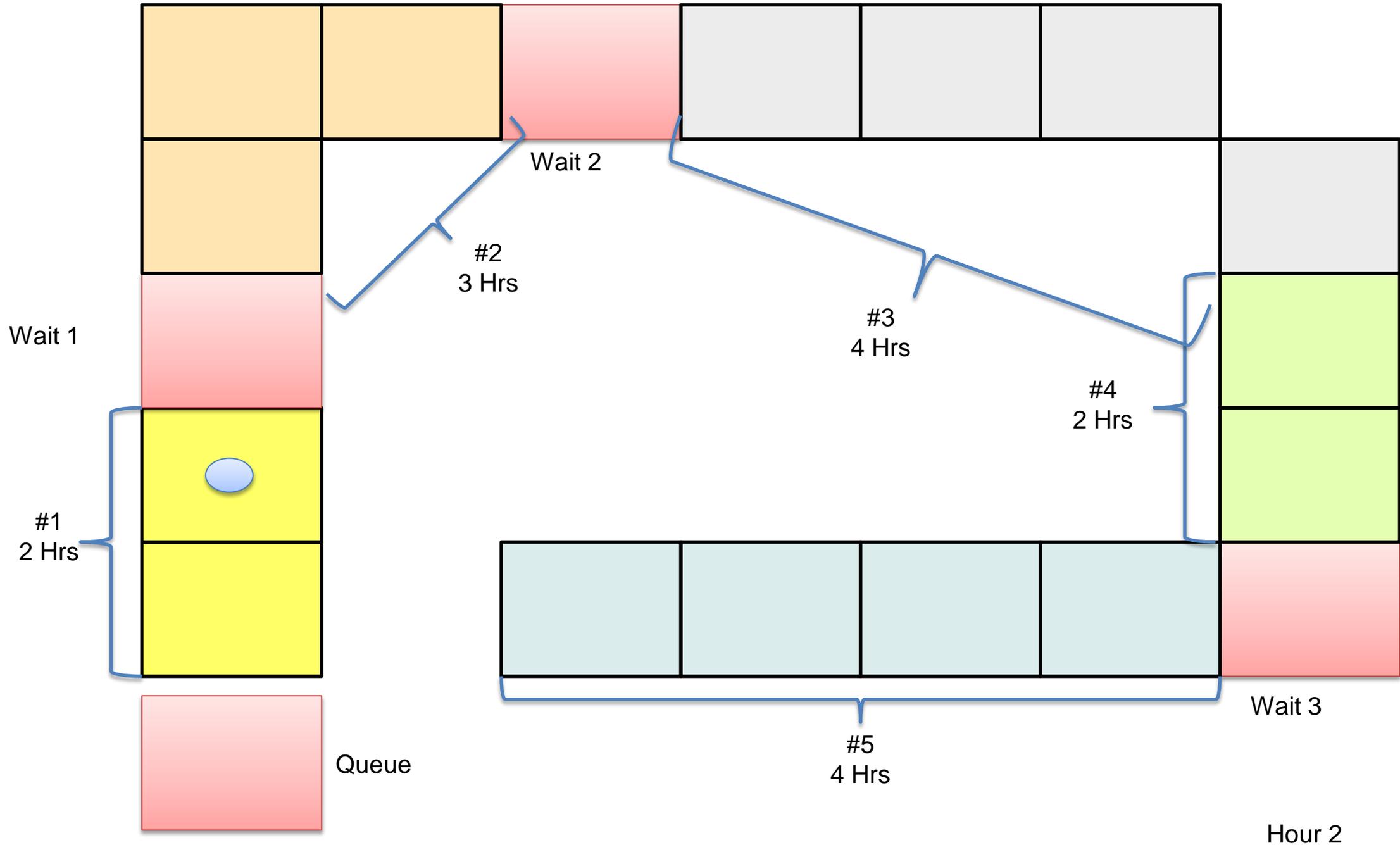
Illustration #1:

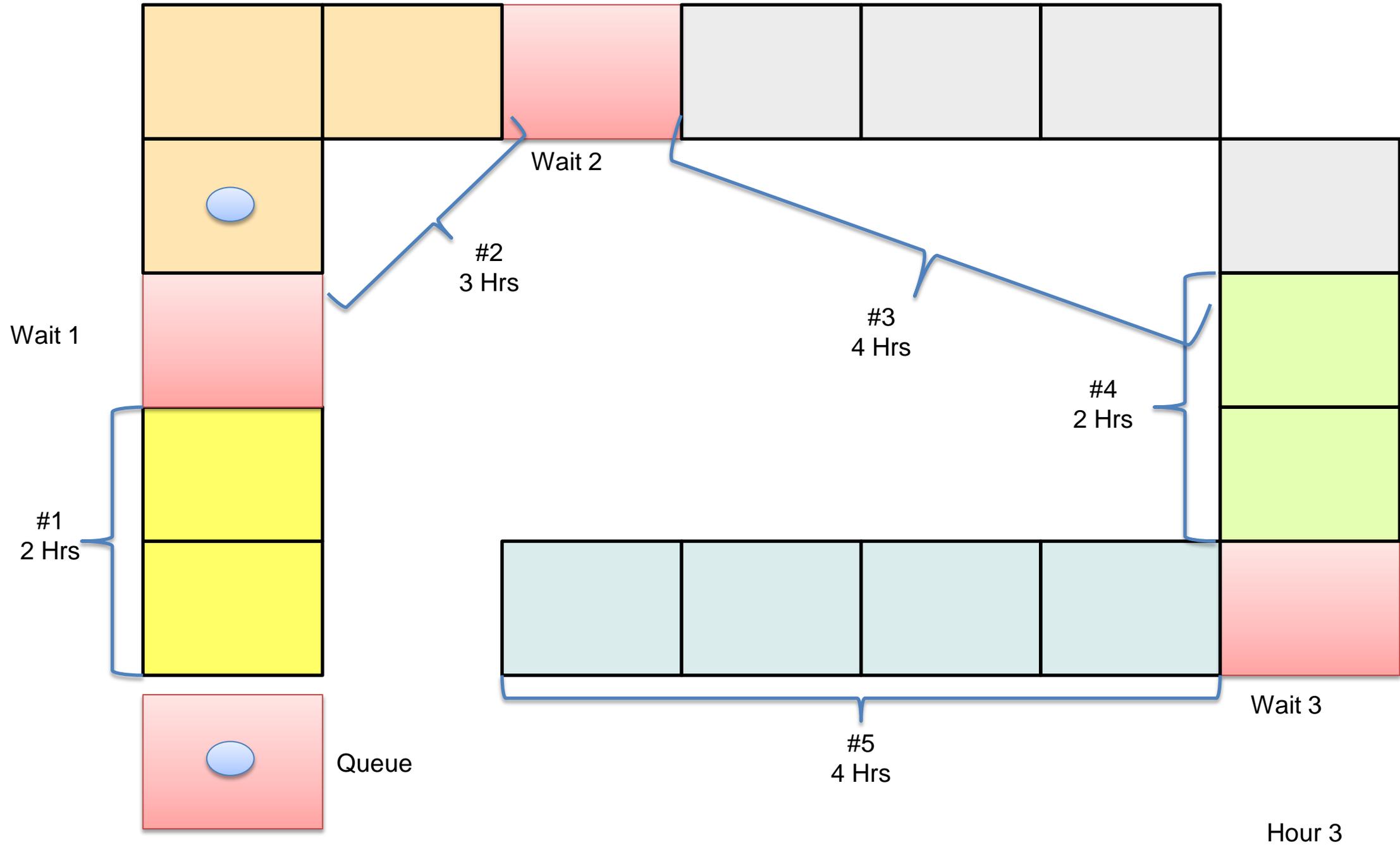
Managing WIP entering the system

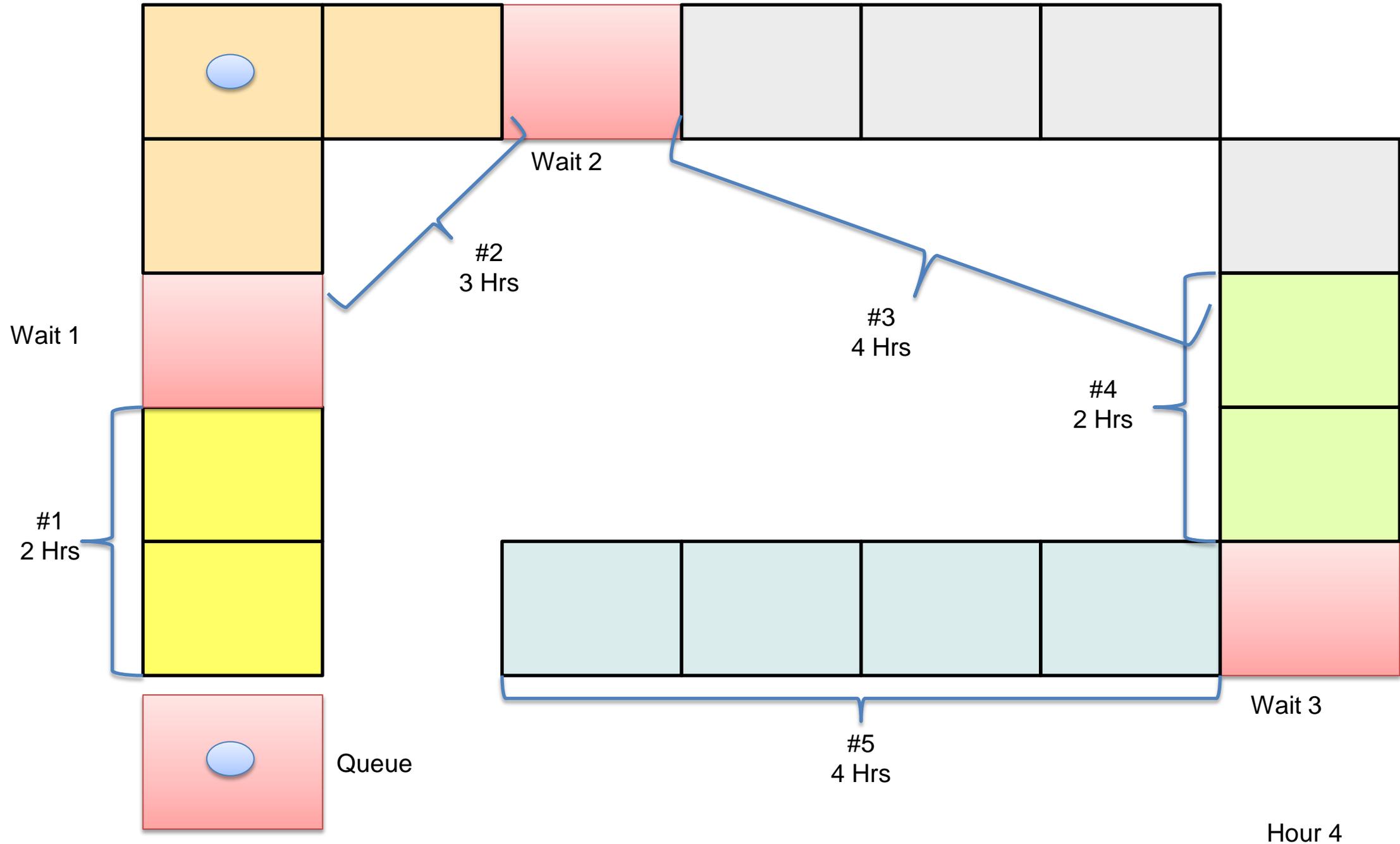


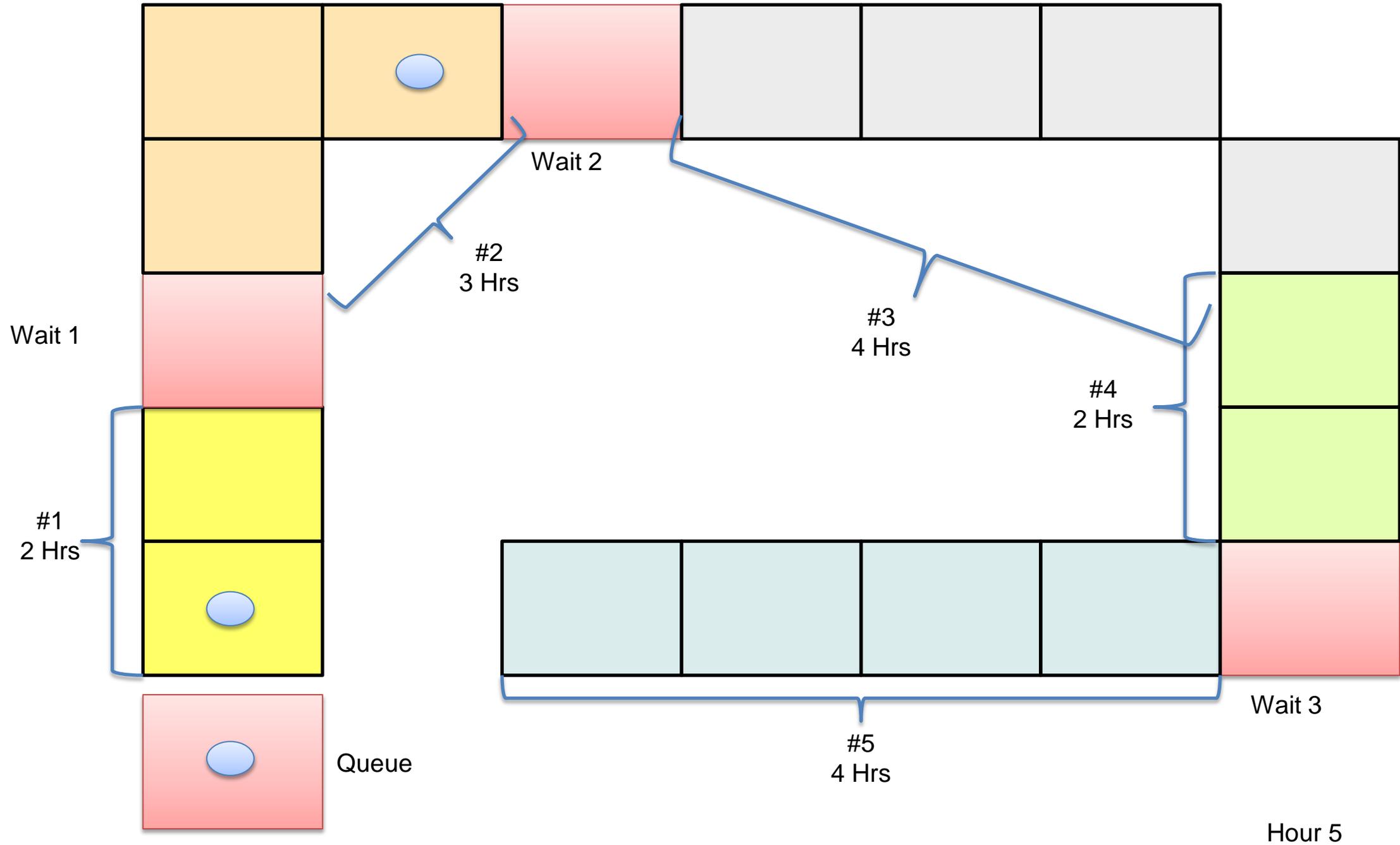






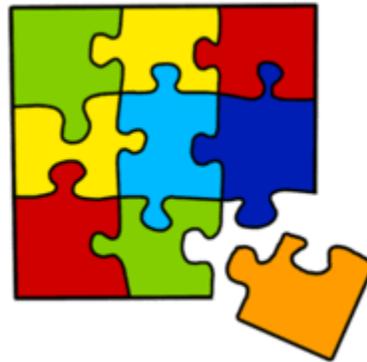






Problem:

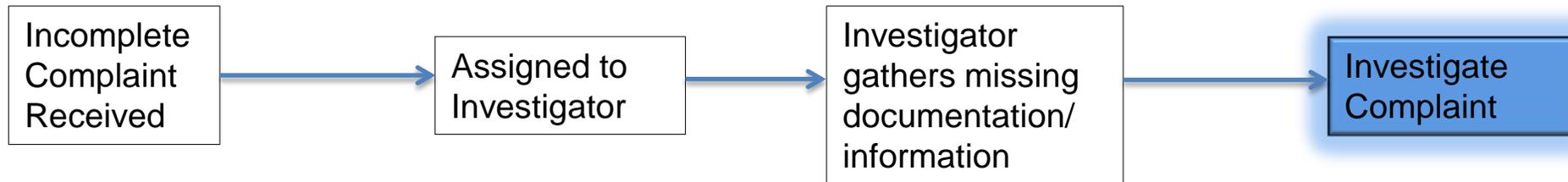
Receiving complaints with incomplete
information



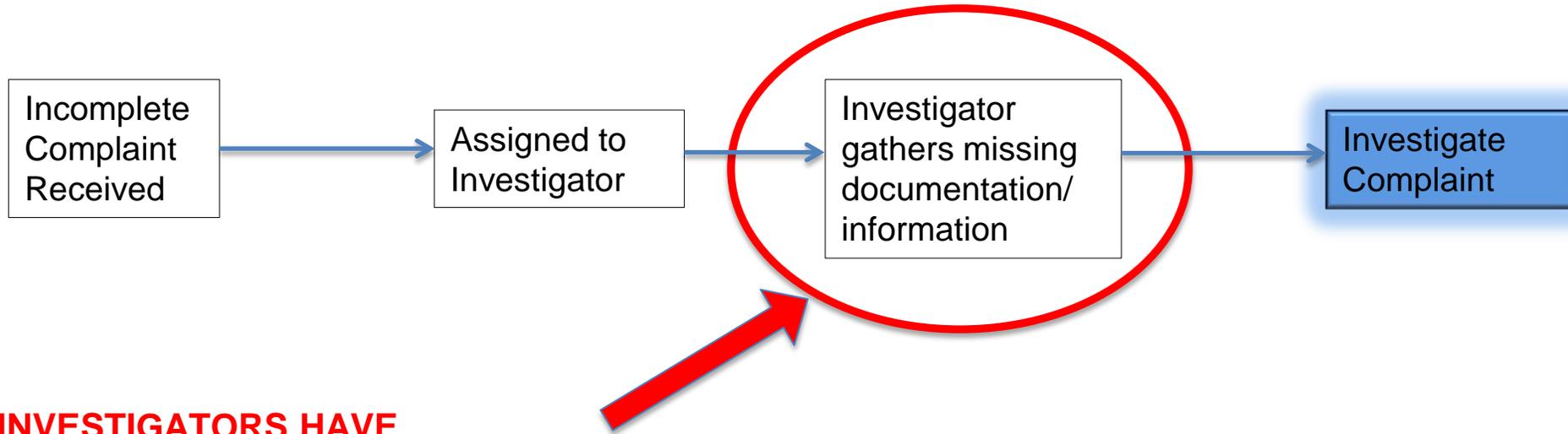
Managing WIP entering the system by full-kitting complaints



Prior Process



Prior Process



INVESTIGATORS HAVE INCREASED WIP DOING NON-BLUE-LIGHT ACTIVITY

Ideas for Controlling WIP:

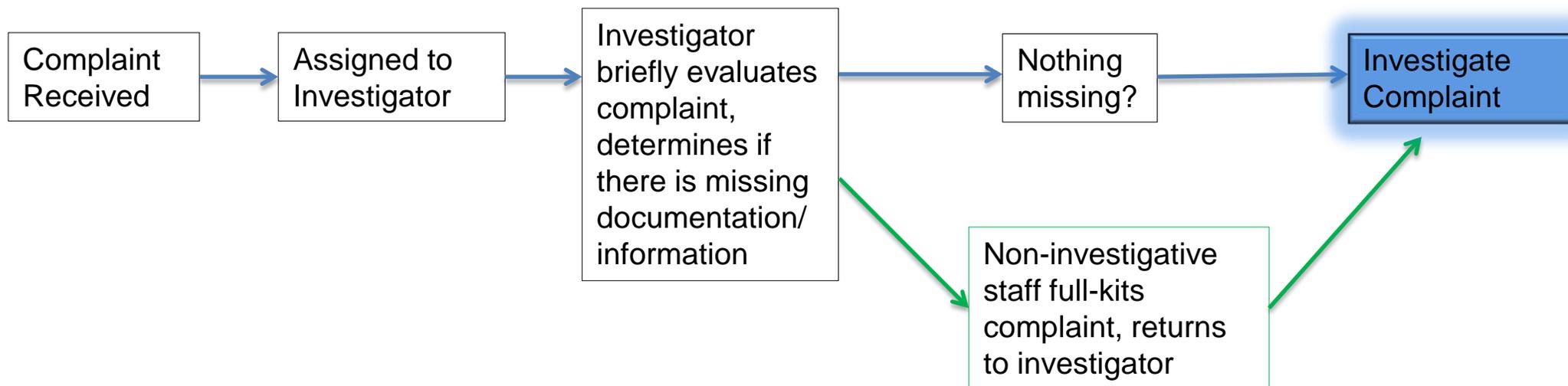
- 1) Avoid having WIP on someone's desk when completion is out of their person's control
- 2) Controlling WIP at the point of what enters the system, but where it is there



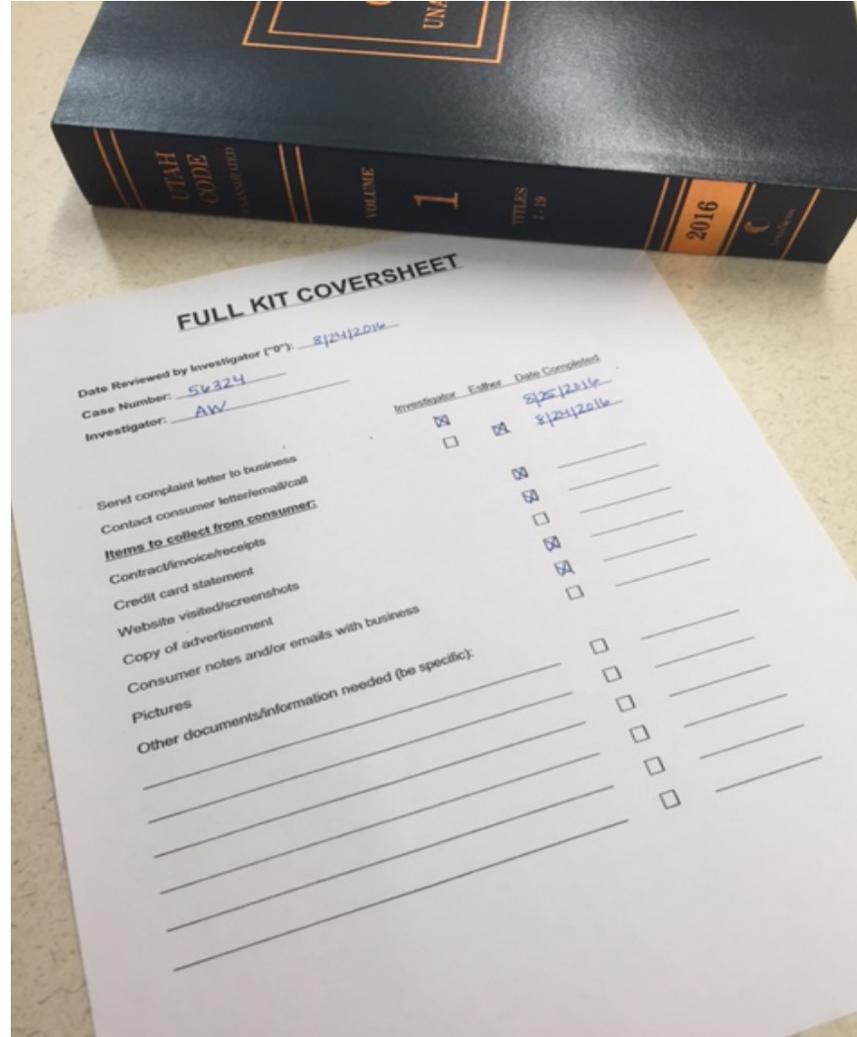
- 3) A person's WIP should be their blue-light activity**



Implemented Full-Kitting Process



Full-kit
worksheet
to manage
the
transition



FULL KIT COVERSHEET

Date Reviewed by Investigator ("0"): 8/24/2016

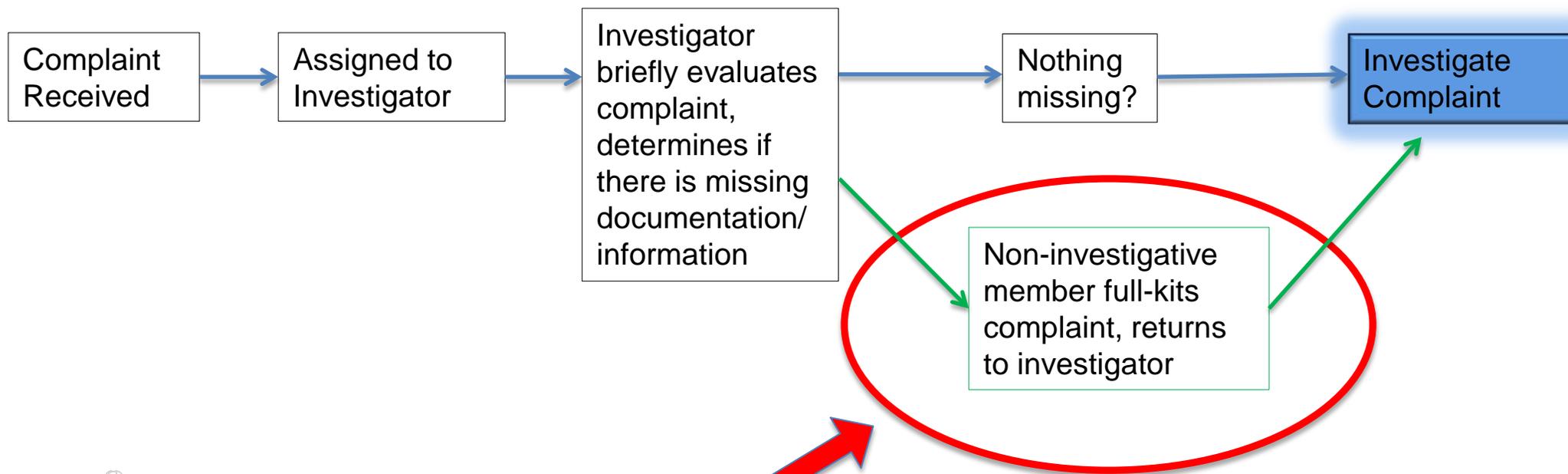
Case Number: 56324

Investigator: AW

	Investigator	Esther	Date Completed
Send complaint letter to business	<input checked="" type="checkbox"/>		<u>8/25/2016</u>
Contact consumer letter/email/call	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>8/24/2016</u>
Items to collect from consumer:			
Contract/invoice/receipts		<input checked="" type="checkbox"/>	_____
Credit card statement		<input checked="" type="checkbox"/>	_____
Website visited/screenshots		<input type="checkbox"/>	_____
Copy of advertisement		<input checked="" type="checkbox"/>	_____
Consumer notes and/or emails with business		<input checked="" type="checkbox"/>	_____
Pictures		<input type="checkbox"/>	_____
Other documents/information needed (be specific):			_____
_____	<input type="checkbox"/>		_____
_____	<input type="checkbox"/>		_____
_____	<input type="checkbox"/>		_____
_____	<input type="checkbox"/>		_____
_____	<input type="checkbox"/>		_____
_____	<input type="checkbox"/>		_____



Result: Reduced Investigator WIP



REDUCED WIP, INCREASED CAPACITY

Illustrations #2 and #3:

- 1) Avoid having WIP on someone's desk when completion is outside the person's control**
- 2) Controlling WIP is not just what enters the system, but what remains there
- 3) A person's WIP should be their blue-light activity



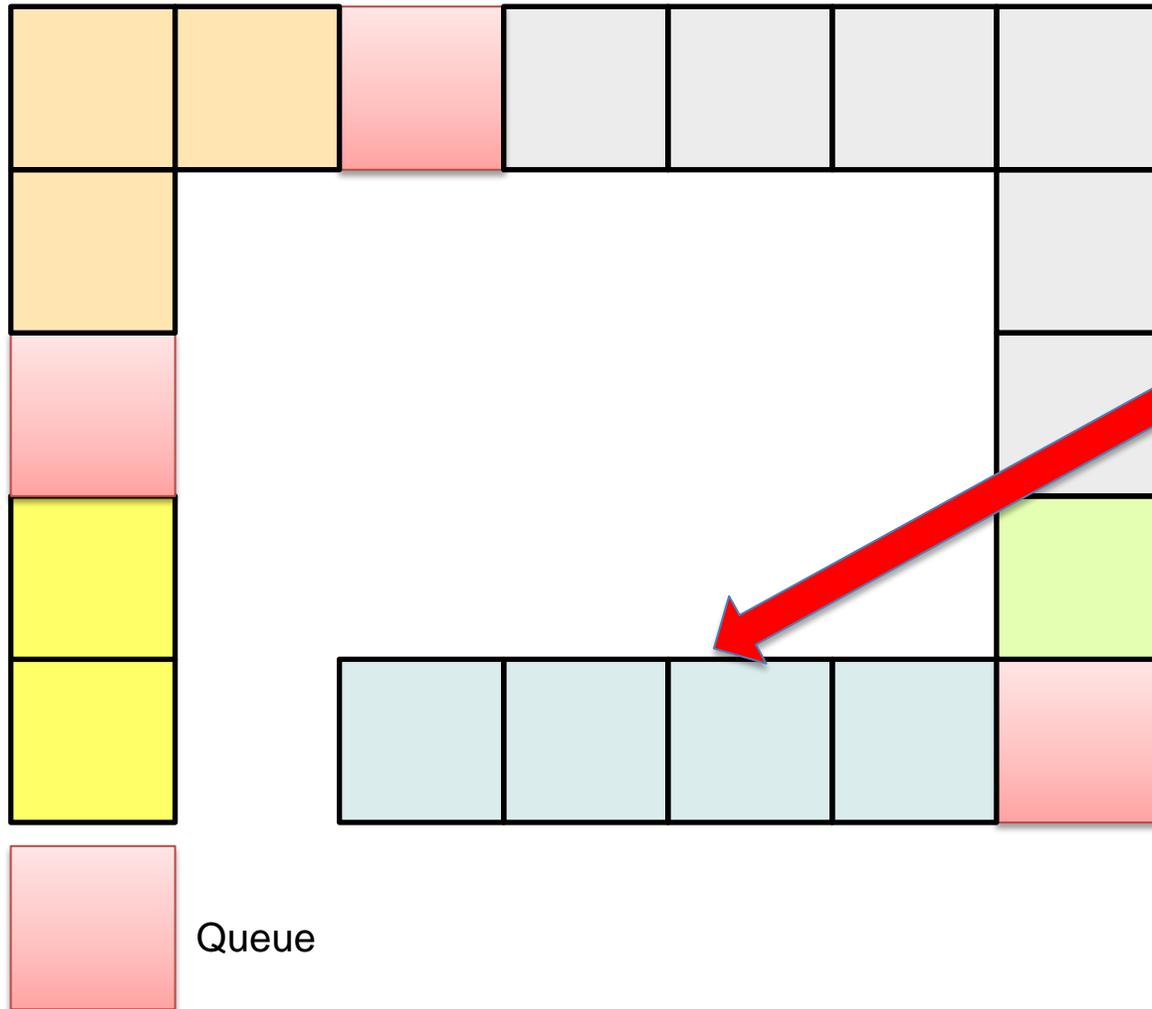
Illustrations #2 and #3:

- 1) Avoid having WIP on someone's desk when completion is outside the person's control
- 2) Controlling WIP is not just what enters the system, but what remains there**
- 3) A person's WIP should be their blue-light activity



Pipes





CONTROL WIP AT ALL PLACES IN SYSTEM, NOT JUST POINT OF ENTRY



Illustration #2:

Compliance with Settlement Agreements

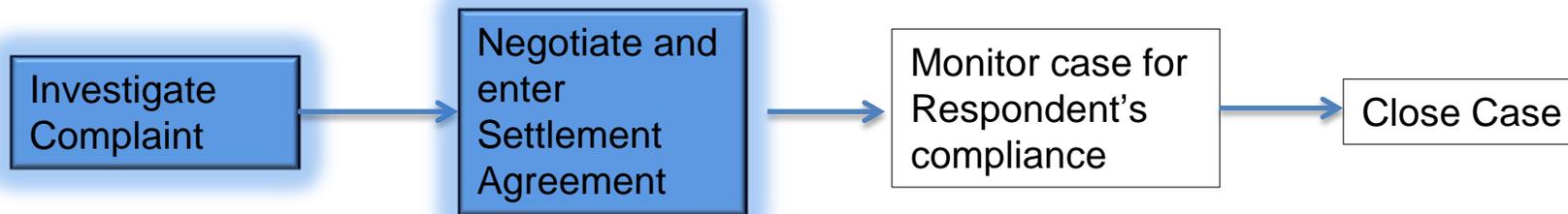


Problem:

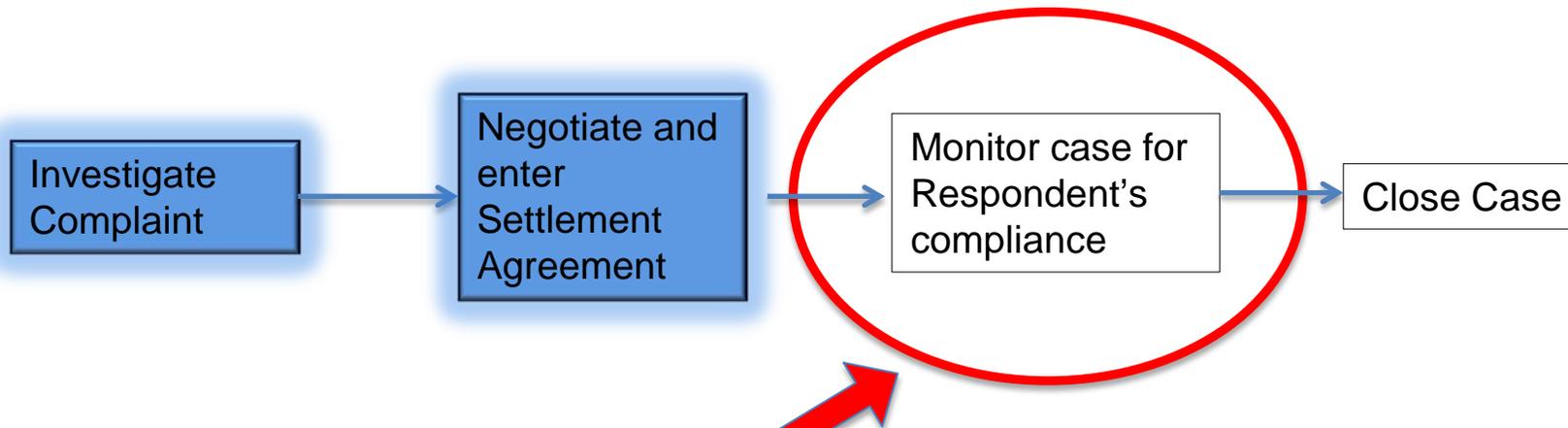
Investigators monitoring settlement agreements for compliance



Prior Settlement Monitoring Process



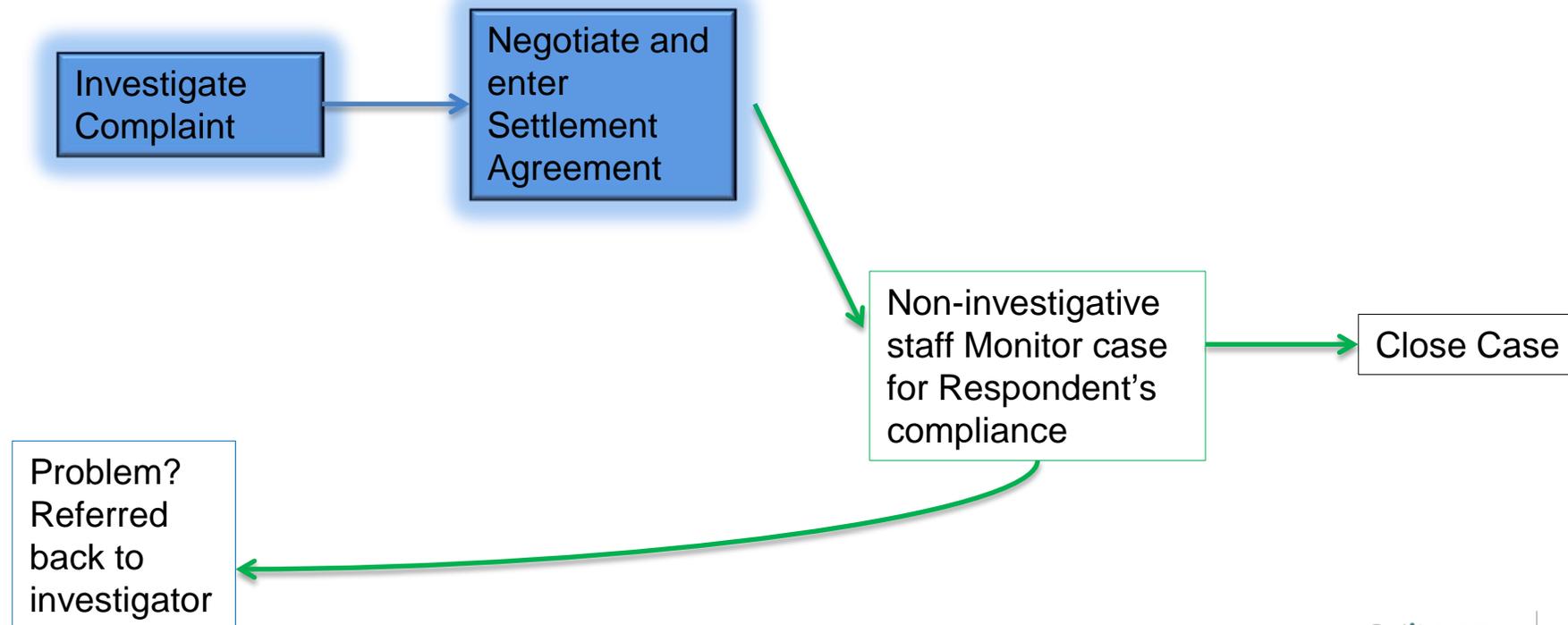
Prior Settlement Monitoring Process



**WIP REMAINING IN SYSTEM
THAT CAN EXIT. INVESTIGATOR
CANNOT DO ANYTHING TO
CLOSE THE CASE.**



New Settlement Monitoring Process



Settlement
Compliance
worksheet
to manage
the
transition



SETTLEMENT COMPLIANCE TRACKING COVERSHEET

Investigator: AW

Case Number: 58173

Date Submitted by Investigator: _____

Pre-Submission Checklist:

- Case notes completed
- Incident disposition changed from "4" to "4.5"
- Closure date entered
- Copy made of settlement agreement
- Highlight portions of settlement that need to be monitored
- Fill out this coversheet.
- Attach this coversheet and copy of highlighted settlement to front of case file
- Submit to Esther

Section(s) and subsections to monitor: 13-11-4

If payments are being made is the money going to: Fine, or Restitution

Instructions for Esther:

monitor section 5a for fine payments
total fine is due by 11/01/2016

Result: Reduced WIP

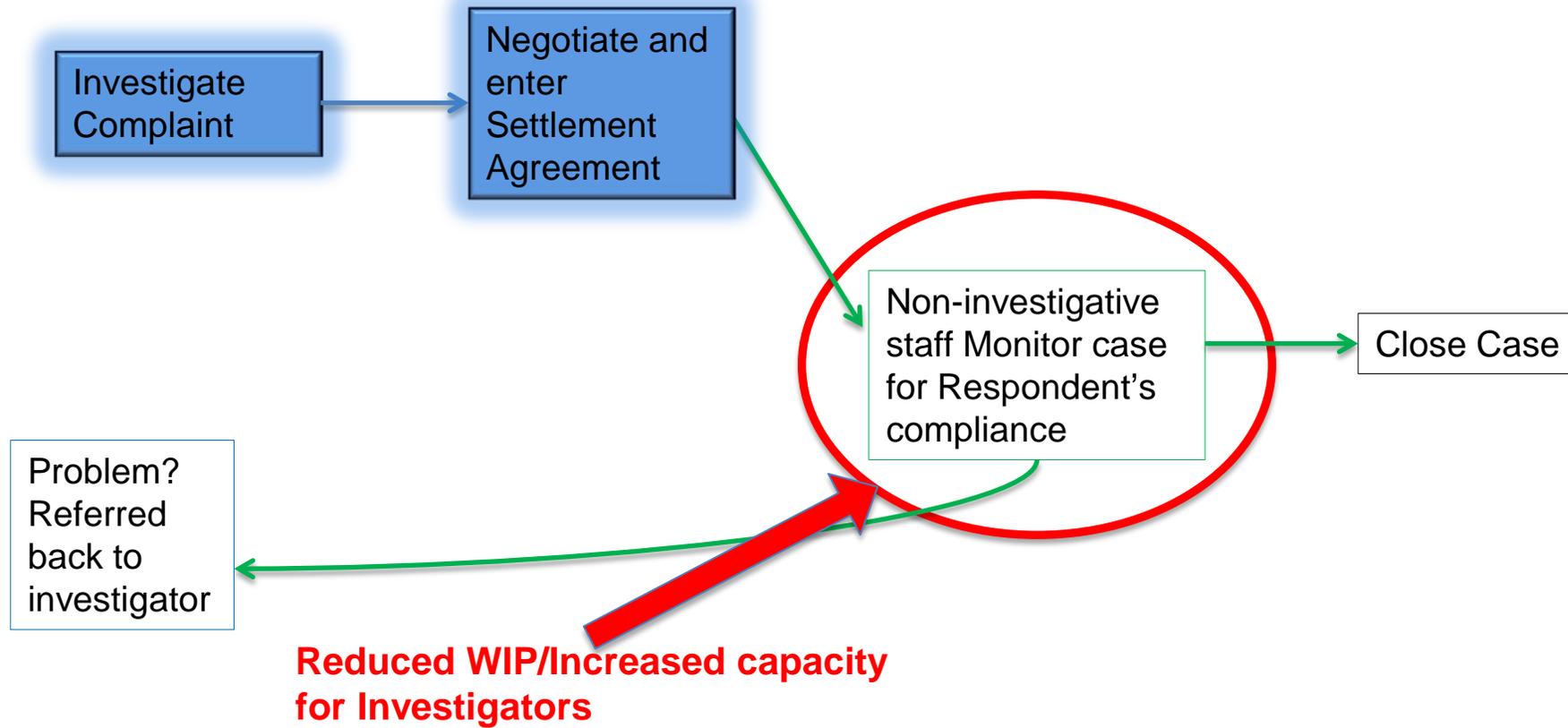


Illustration #3:

Cases on appeal

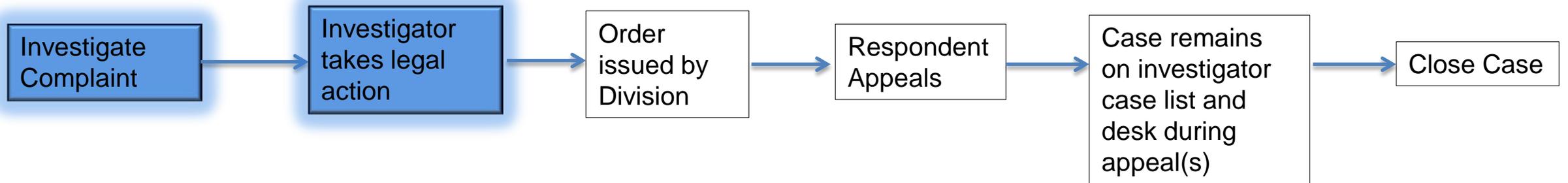


Problem:

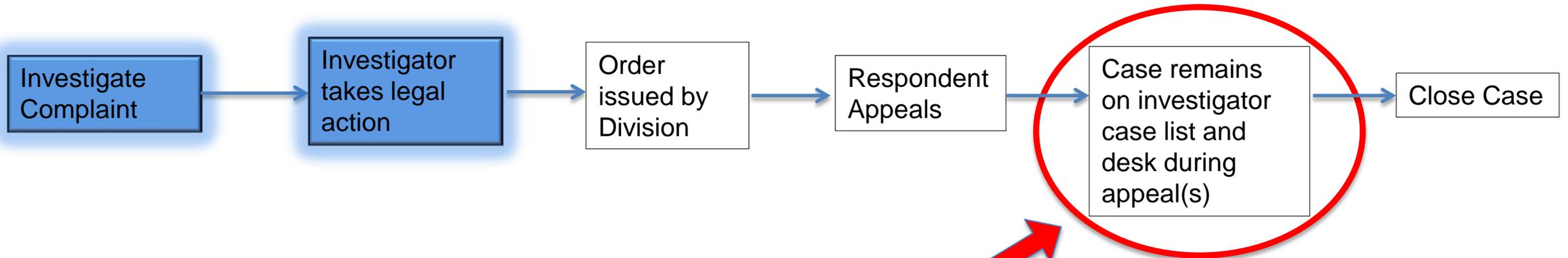
Cases remaining on investigator case lists
while on appeal



Prior Process – Cases on Appeal



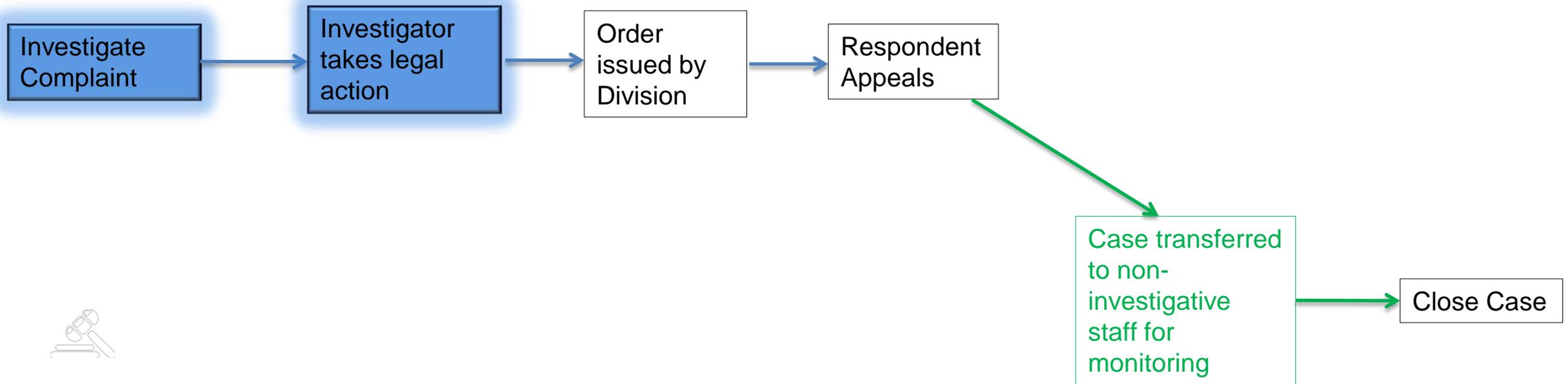
Prior Process – Cases on Appeal



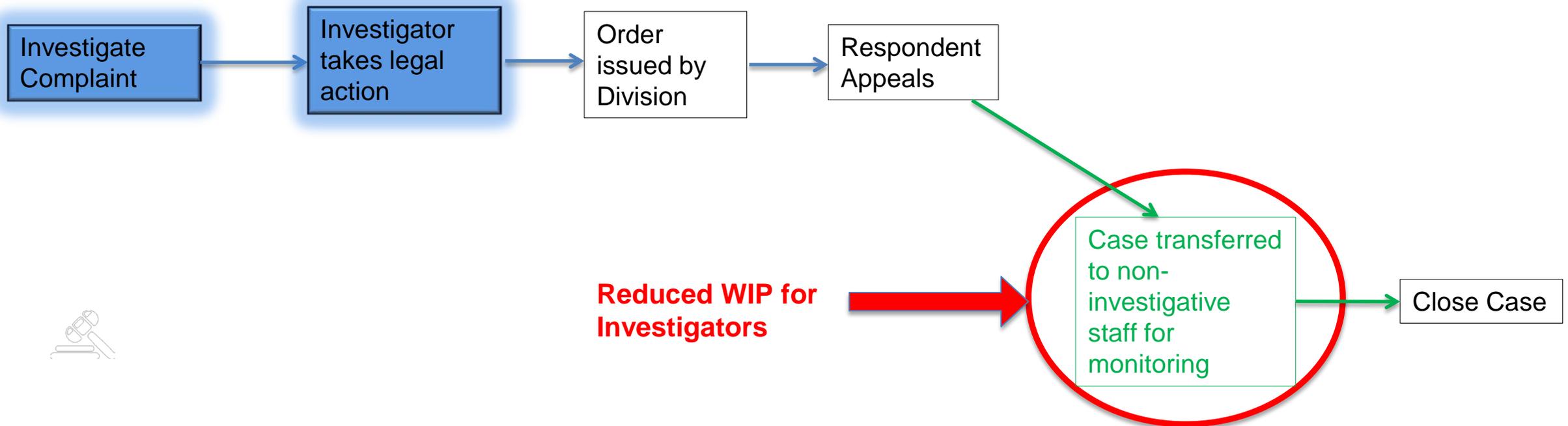
**WIP REMAINING IN SYSTEM
THAT CAN EXIT. INVESTIGATOR
CANNOT DO ANYTHING TO
CLOSE THE CASE.**



New Process– Cases on Appeal



Result: Reduced WIP



1) Aren't you just shuffling the work around?

- Increased capacity where we need it most – shifting work to where we have capacity
- Gaining efficiencies

 2) These are small improvements

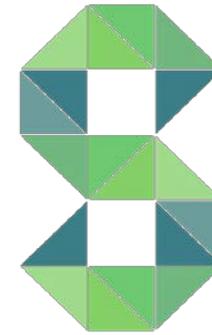
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Questions?





S U C C E S S
— F R A M E W O R K —