

The Super Bowl Event – Unlocking the Potential of Traction Power Simulation Modeling to aid in Event Planning

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2018 Rail Conference

Super Bowl LII - Minneapolis, MN



Super Bowl LII – Minneapolis, MN



Steps

1. Pre-Game Planning
2. Operating Plan Development
3. Game Day – Touchdown



Pre-Game Planning

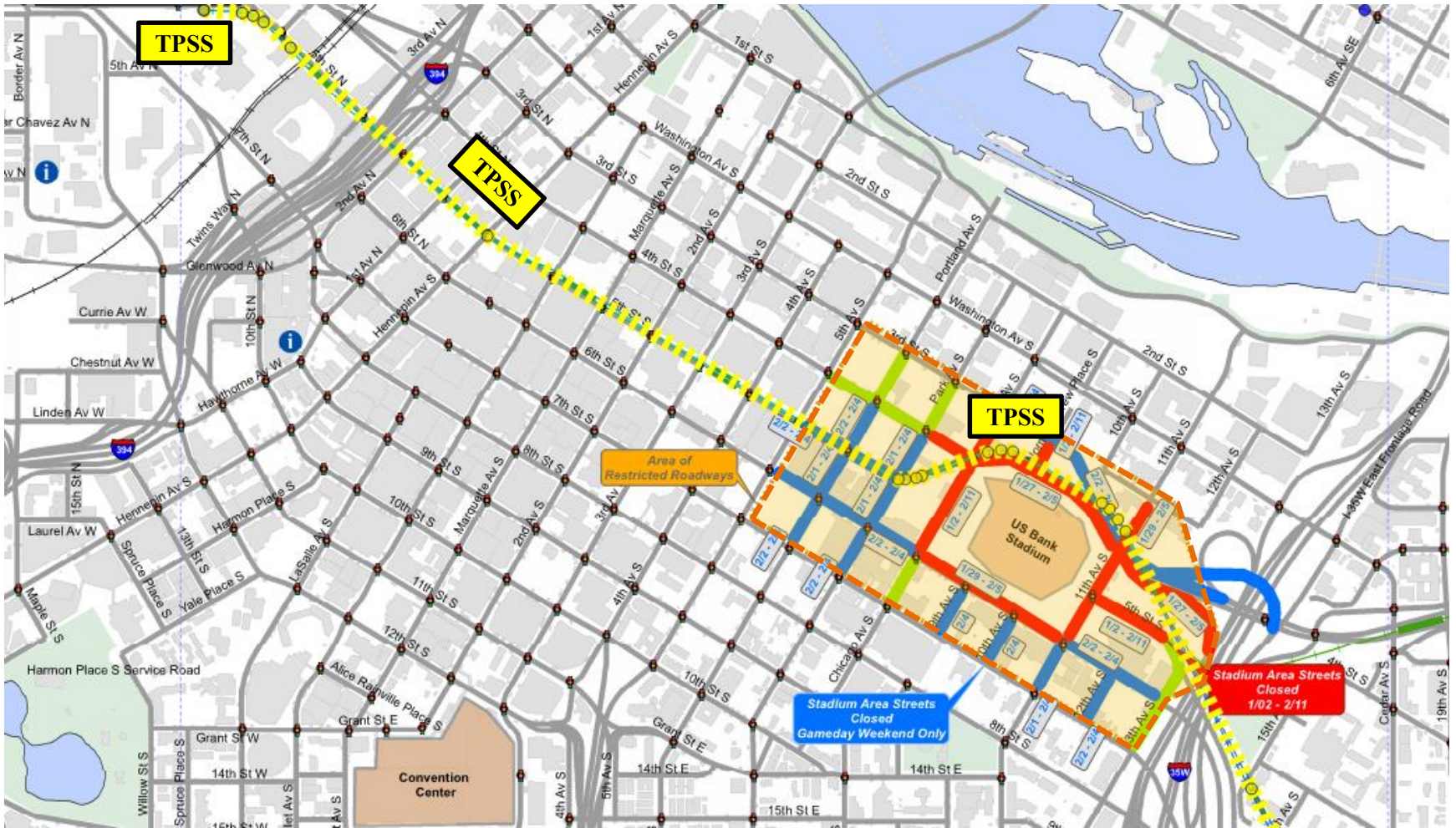
- Metro Transit
 - Planning Details
 - Security Measures
 - Operating Planning
 - NFL
 - Community
 - Emergency Preparedness

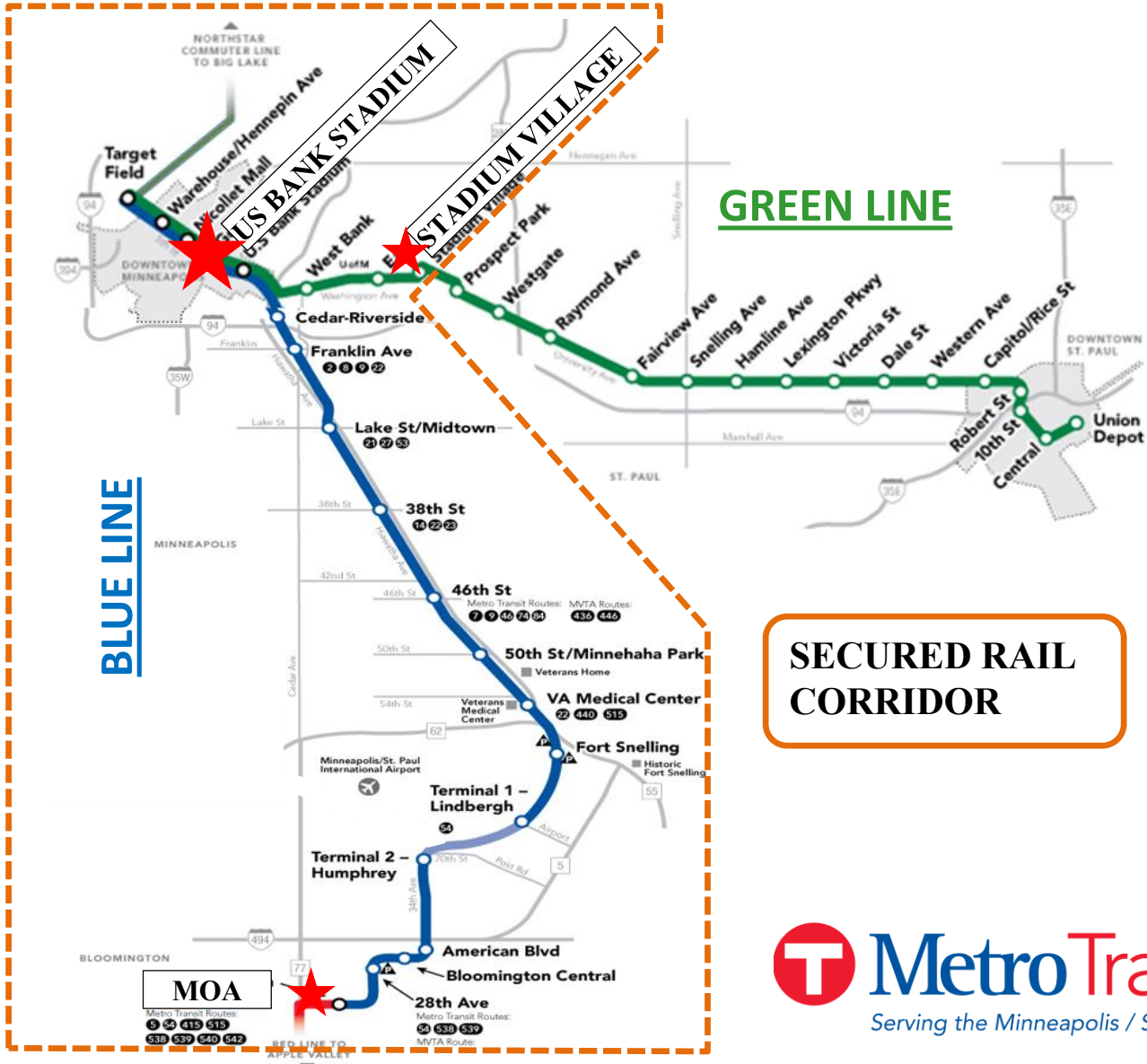


Super Bowl LII – Minneapolis, MN



Super Bowl LII - Security





TrainOps® Model Building Blocks

Track

Vehicle

Operation

Signal

Electrical

TrainOps®

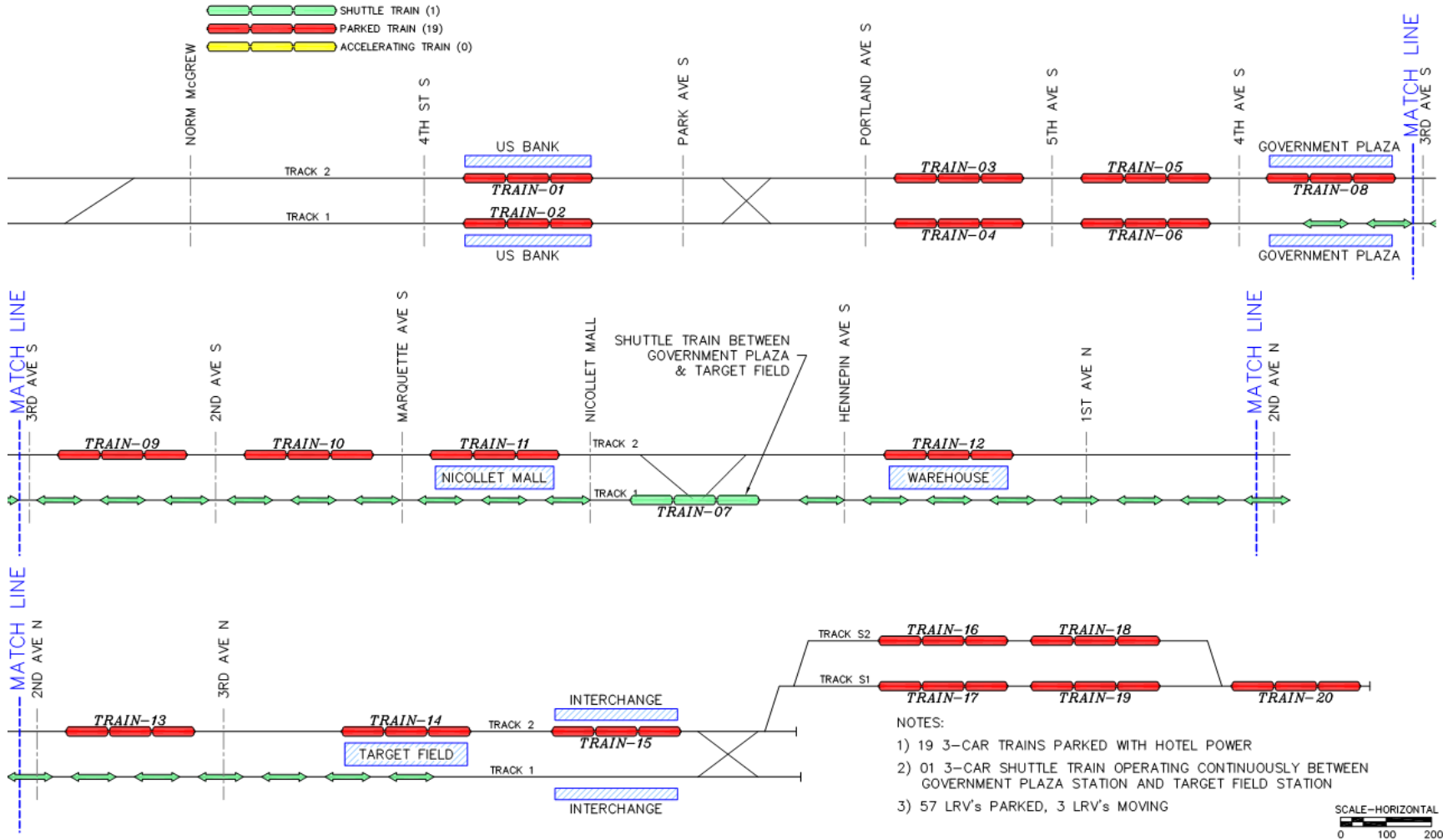
Simulator by **LTK**

TRAIN OPERATIONS • TRACTION POWER • TRAIN CONTROL • TRAFFIC MODELING

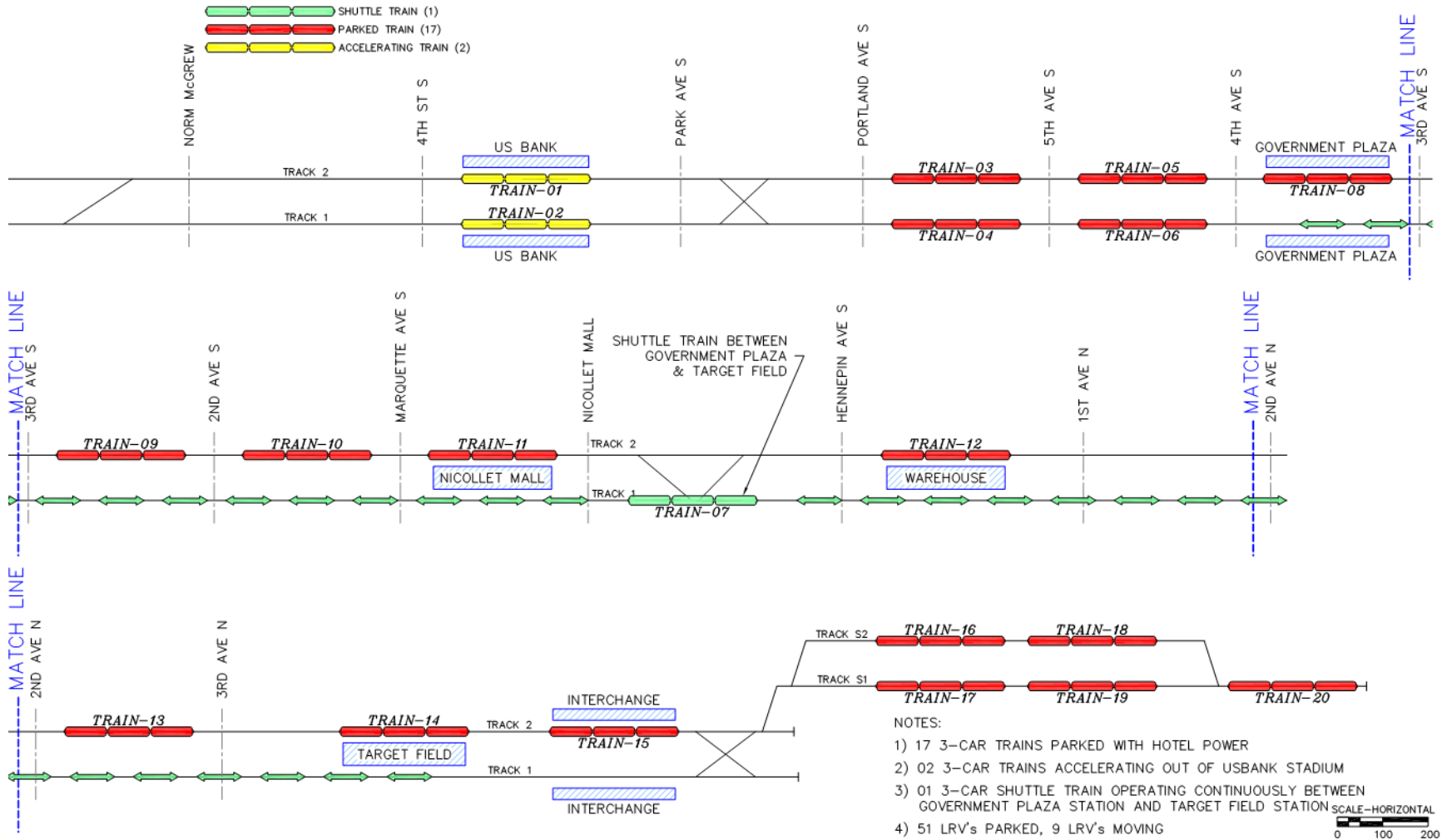
Base Operating Plan

- 20 3-Car Trains (60 Cars Total) Stored Downtown
- Trains Stored Downtown: 5:30 p.m. – 9:30 p.m.
- Traffic Signal Stops: 30s
- US Bank Stadium Train Departures:
 - Trains begin departing at 9:30 p.m. (AW3 loading)
 - Remaining staged trains advance simultaneously
- Shuttle Service
 - Operates between Government Plaza and Target Field stations
 - Operates continuously starting at 5:30 p.m.

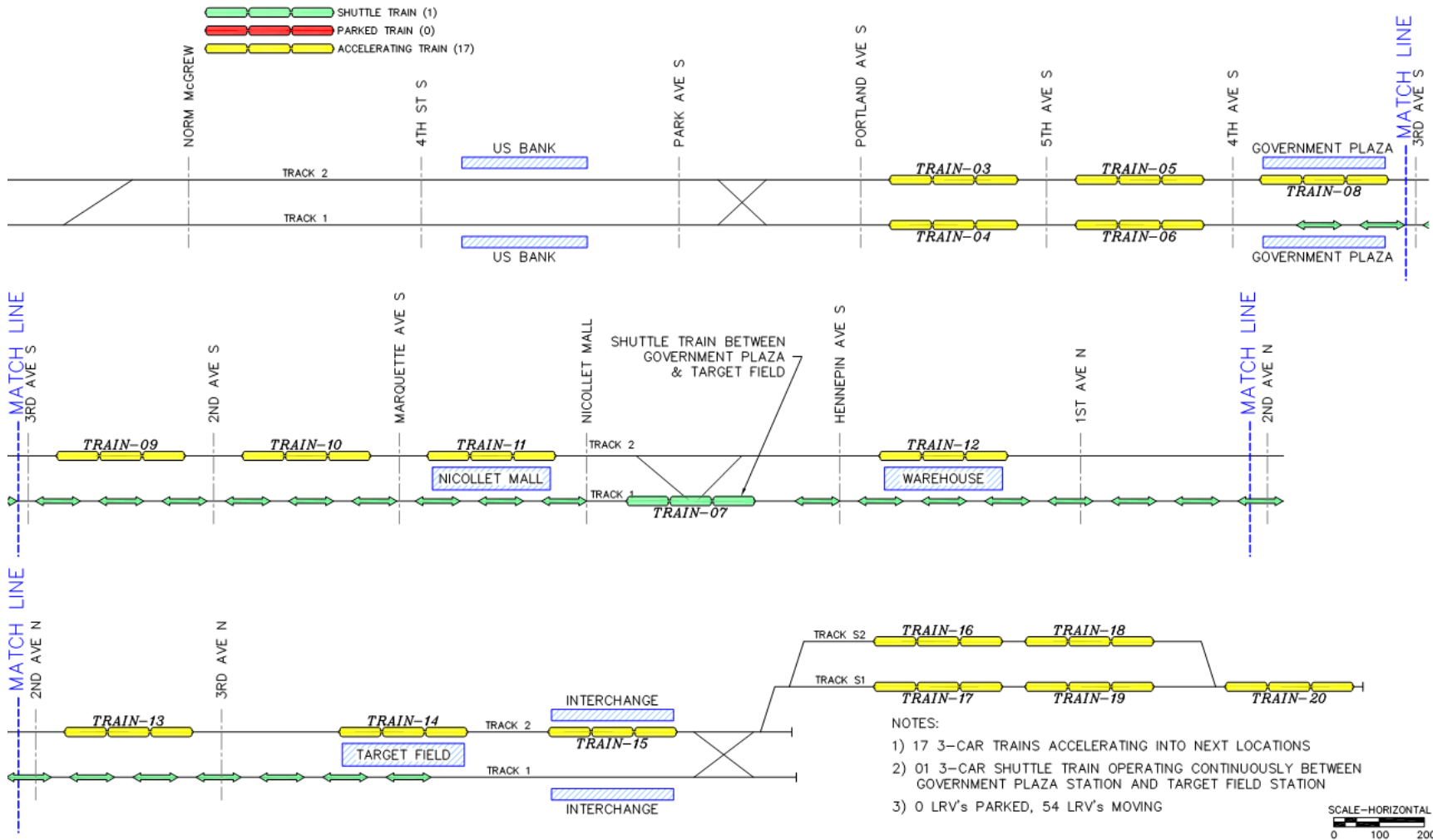
Metro Transit Operating Plan



Metro Transit Operating Plan

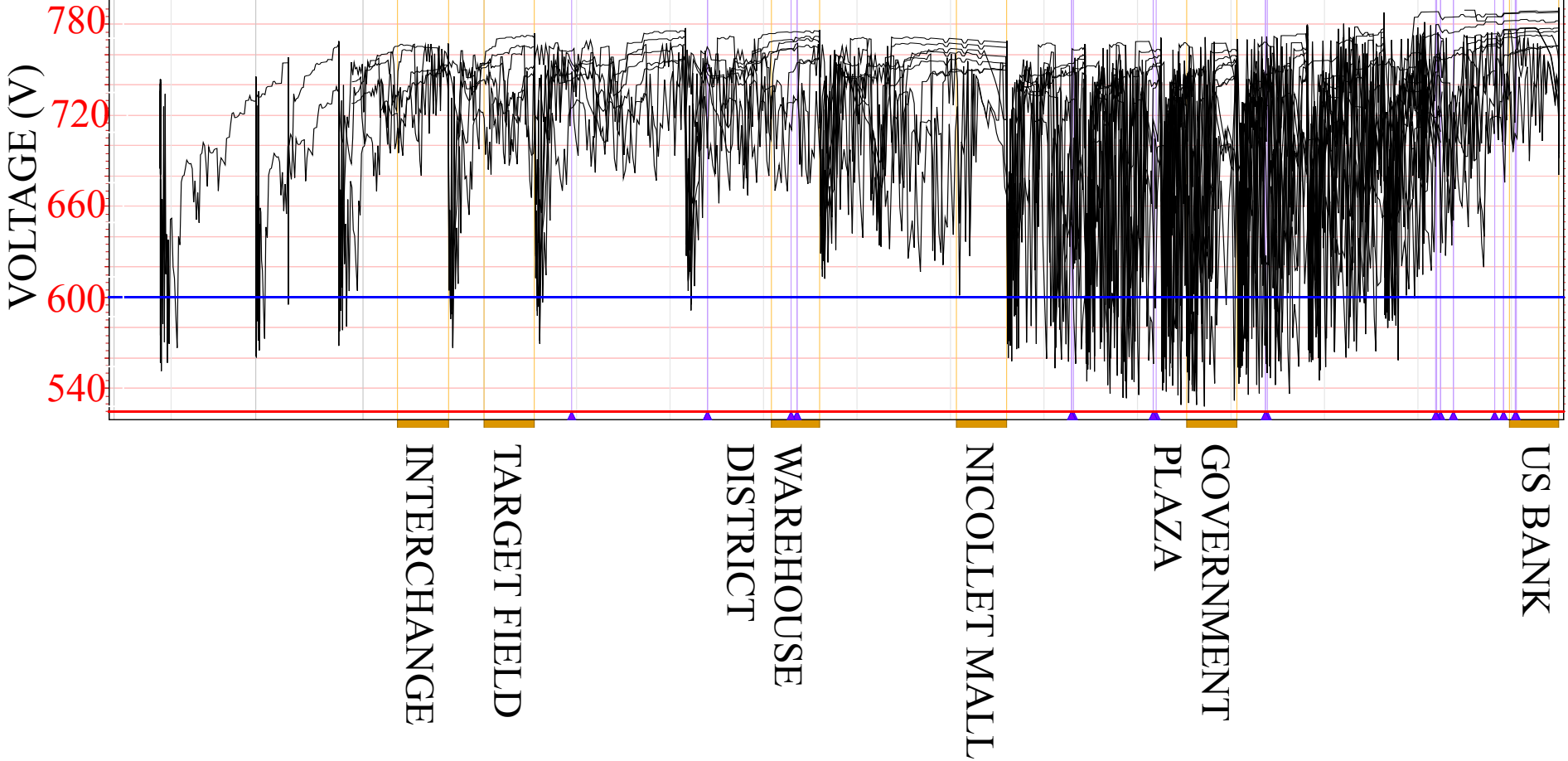


Metro Transit Operating Plan

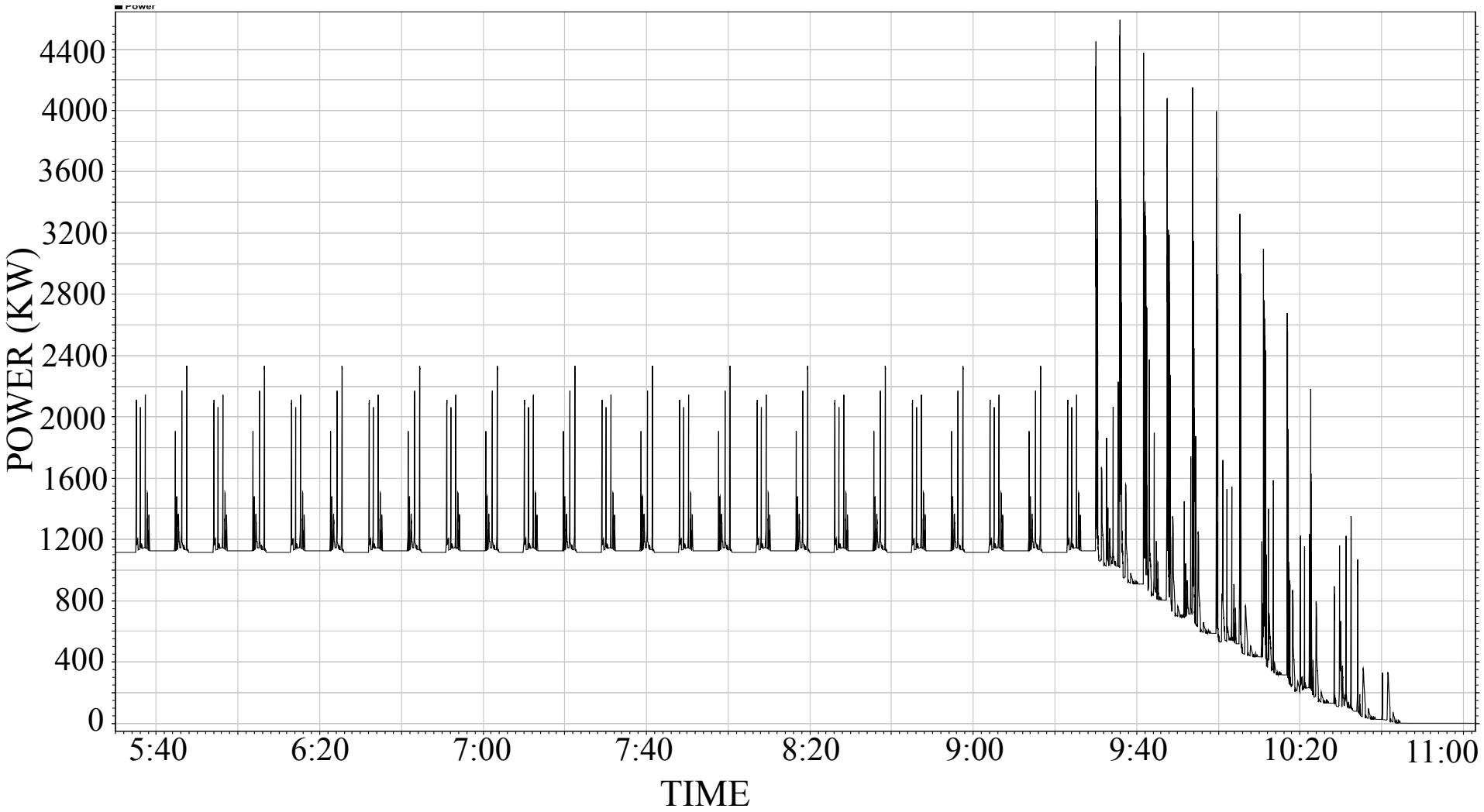


Train Voltage Profile

ROUTE VOLTAGES AT TRAINS – SB
5:30 p.m. – 11:02 p.m.



Substation 14 Power Profile



Final Game Day Operating Plan

Two separate operating plans for the following conditions:

- Normal Operations – All substations in-service
- Emergency Operations – Loss of a substation



Final Scenario Game Day Normal Operating Plan

- 20 3-Car Trains (60 Cars Total) Stored Downtown
- Trains Stored Downtown: 5:30 p.m. – 9:30 p.m.
- Traffic Signal Stops: 30s
- US Bank Stadium Train Departures:
 - Trains begin departing at 9:30 p.m. (AW3 loading)
 - Remaining staged trains advance in succession with a delay of 30s
- Shuttle Service
 - Operates between Government Plaza and Target Field stations
 - Operates continuously starting at 5:30 p.m.

Final Scenario Game Day Normal Operating Plan Summary of Results

Minimum Train Voltage	
Normal (Min. 600 Vdc)	Acceptable
Emergency (Min. 525 Vdc)	Unacceptable
Maximum Rail Voltage	
Normal (Max. 50 Vdc)	Acceptable
Emergency (Max. 90 Vdc)	Acceptable
Substation Loading	
Normal	Acceptable
Emergency	Unacceptable
OCS Temperature	
Normal	Acceptable
Emergency	Acceptable
Traction Power Cable Loading	
Normal	Marginally Acceptable
Emergency	Unacceptable
Breaker Relay Settings	Updated Settings Provided

Final Scenario Game Day Emergency Operating Plan

- 20 3-Car Trains (60 Cars Total) Stored Downtown
- Trains Stored Downtown: 5:30 p.m. – 9:30 p.m.
- **Trains 10-20 in Layover Mode (16.5 kW/car)**
- Traffic Signal Stops: 30s
- US Bank Stadium Train Departures:
 - Trains begin departing at 9:30 p.m. (AW3 loading)
 - **Remaining staged trains advance in succession with a delay of 30s**
- Shuttle Service
 - Operates between Government Plaza and Target Field stations
 - Operates continuously starting at 5:30 p.m.

Final Scenario Game Day Emergency Operating Plan Summary of Results

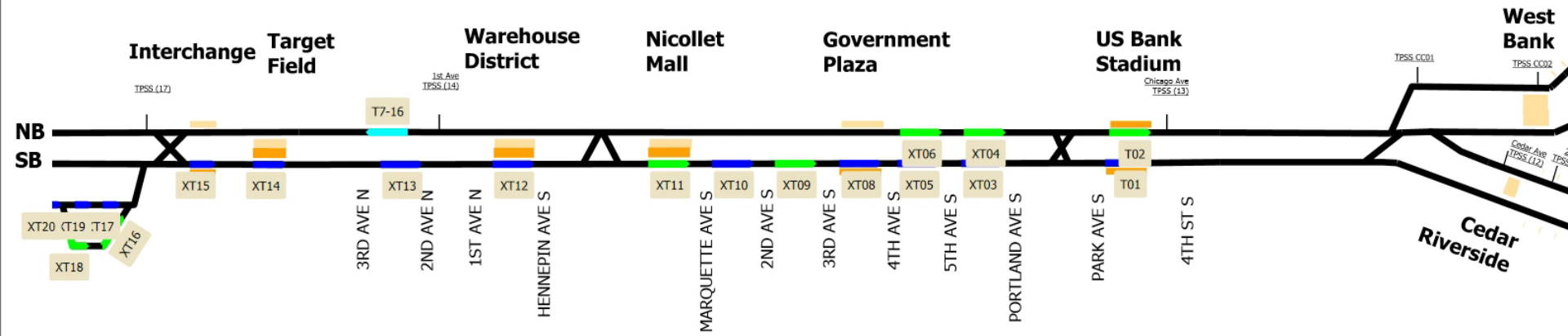
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Substation Loading	
Normal	Acceptable
Emergency	Acceptable
OCS Temperature	
Normal	Acceptable
Emergency	Acceptable
Traction Power Cable Loading	
Normal	Marginally Acceptable
Emergency	Marginally Acceptable
Breaker Relay Settings	Updated Settings Provided

Train Movements – Live Demonstration

20:59:49.500

Train Colors

- Mall of America
- Union Depot
- Shuttle
- All other trains



Screencast-O-Matic.com

Game Day – Feb. 4th, 2018



Game Day – Feb. 4th, 2018



Takeaways

- Plan early
- Test event plan first
- Simulation modeling is an essential tool in assessing the inner workings and limits of the various systems



Questions?

