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

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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
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

NOTES:
1) 17 3-CAR TRAINS PARKED WITH HOTEL POWER
2) 02 3-CAR TRAINS ACCELERATING OUT OF US BANK STADIUM
3) 01 3-CAR SHUTTLE TRAIN OPERATING CONTINUOUSLY BETWEEN GOVERNMENT PLAZA STATION AND TARGET FIELD STATION
4) 51 LRVs PARKED, 9 LRVs MOVING

SCALE-HORIZONTAL
0 100 200
Train Voltage Profile

ROUTE VOLTAGES AT TRAINS – SB
5:30 p.m. – 11:02 p.m.
Substation 14 Power Profile

Power (KW) vs. Time

- 0 kW
- 400 kW
- 800 kW
- 1200 kW
- 1600 kW
- 2000 kW
- 2400 kW
- 2800 kW
- 3200 kW
- 3600 kW
- 4000 kW
- 4400 kW

Time:
- 5:40
- 6:20
- 7:00
- 7:40
- 8:20
- 9:00
- 9:40
- 10:20
- 11:00
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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal (Min. 600 Vdc)</th>
<th>Emergency (Min. 525 Vdc)</th>
<th>Normal (Max. 50 Vdc)</th>
<th>Emergency (Max. 90 Vdc)</th>
<th>Normal</th>
<th>Emergency</th>
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<tbody>
<tr>
<td>Minimum Train Voltage</td>
<td>Acceptable</td>
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<td>Traction Power Cable Loading</td>
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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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Game Day – Feb. 4th, 2018
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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?